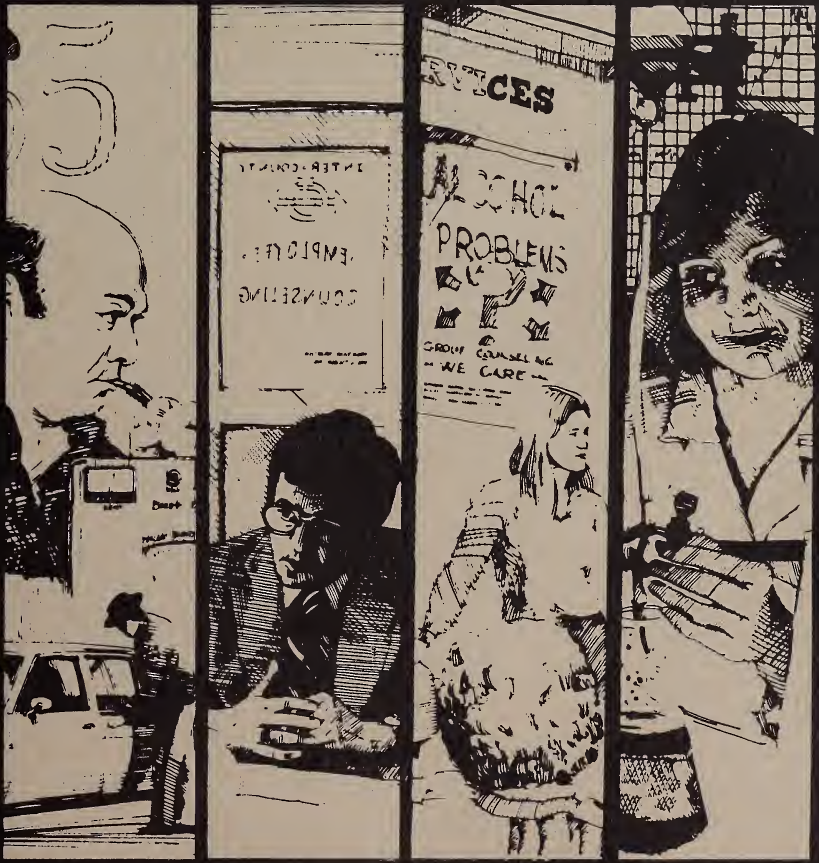
National Institute on Alcohol Abuse and Alcoholism

Alcohol and Health Monograph 1

Alcohol Consumption and Related Problems



U.S. DEPARTMENT OF HEALTH AND
HUMAN SERVICES

Public Health Service

Alcohol, Drug Abuse, and
Mental Health Administration

Alcohol and Health Monograph No. 1

Alcohol Consumption and Related Problems

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Public Health Service
Alcohol, Drug Abuse, and Mental Health Administration

National Institute on Alcohol Abuse and Alcoholism
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Foreword

With the publication of the Alcohol and Health Monograph series, the National Institute on Alcohol Abuse and Alcoholism (NIAAA) endeavors to present a current, comprehensive picture of the broad range of information available on alcoholism and alcohol abuse. The four monographs in the series illustrate the progress that has been made in recent years in all areas of alcohol-related activity.

The monograph on *Alcohol Consumption and Related Problems*, examines alcoholic beverage consumption and the nature of problems associated with consumption from various perspectives, including factors which may lead to alcohol-related problems.

Monograph No. 2, *Biomedical Processes and Consequences of Alcohol Use*, reviews current findings and developments in the field of alcohol-related research and describes the differential effects alcohol exerts on the major systems of the human body.

Monograph No. 3, *Prevention, Intervention and Treatment: Concerns and Models*, describes the three levels of response—primary, secondary, and tertiary—that have been developed to address problems resulting from alcohol use. This monograph reviews current approaches and strategies for prevention; presents the concept of and describes intervention activities; discusses treatment issues and methods; and enumerates currently available resources, as well as those evolving within the Federal, State, local and voluntary sectors to implement alcohol-related programs.

Monograph No. 4, *Special Population Issues*, provides a forum for examining the unique problems of special population groups whose need for alcoholism and alcohol abuse programs has been underserved. This monograph demonstrates that a base of scientific knowledge exists on prevalence, incidence and nature of alcohol-related problems of special population groups defined by sex, age, race and ethnicity.

The information contained in these documents represents the efforts of many experts and scientists in the field of alcoholism. We believe they will be of benefit and interest to the scientific and professional communities as well as the lay public.

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Chapter 1

Alcohol Use and Alcohol Problems Among U.S. Adults: Results of the 1979 National Survey

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Abstract

This paper presents the findings of the 1979 national survey of alcohol use and alcohol problems which was commissioned by the National Institute on Alcohol Abuse and Alcoholism (NIAAA). Two trend studies comparing the 1979 survey with eight other drinking practices surveys funded by NIAAA over a 13-year time period reveals that there are no marked shifts in alcohol consumption or alcohol problems in the population. Further analysis of the 1979 study shows that there is considerable demographic variation among drinking practices in the study sample. Similar to other research findings, males report more alcohol consumption and alcohol problems than females; further, young males report the highest rates of alcohol problems. Among ethnic groups, blacks have a higher rate of abstention, but show similar rates of heavy drinking and problems with alcohol. Although there are too few cases to fully substantiate this finding, extremely high rates of heavy drinking and problems associated with drinking were found among the Hispanics in the sample. It is suggested that further research should be done concerning drinking practices of various ethnic groups in order to test further the findings of this survey.

Introduction

In 1979 the National Institute on Alcohol Abuse and Alcoholism (NIAAA) commissioned a national survey of alcohol use and alcohol-related problems. The sample was drawn to represent the population 18 years of age and older living within the 48 contiguous States. These pages report the findings of this survey, which had several purposes. The first purpose was to describe alcohol use and alcohol problems and

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the correlates of such use. Knowing the nature and the extent of problems related to alcohol use is a step in ameliorating the problems. A second purpose of the 1979 national survey was to compare these findings with past survey research so that a study of trends in drinking and in drinking problems could be carried out. This posed some difficult problems since past studies used a variety of very different questions in determining the rates of drinking problems. However, the questions in the 1979 survey were enough like those asked in past surveys to permit some comparisons to be made, although inevitably some compromises had to be made to keep the number of questions to a reasonable limit. The third purpose was to focus attention on some special segments of the U.S. population, such as people in the age range 18-20 years, who had been studied very little in past work. Black and Hispanic Americans were also to be singled out for attention in the 1979 survey and special attention was to be paid to alcohol use and alcohol problems among women.

These requirements correspond to the sections in this first analysis of the 1979 survey data. The first section describes which subgroups of the population are well covered in this survey and which are not. The second section discusses trends in alcohol use and alcohol problems. The third section explores alcohol use and alcohol problems in the U.S. population aged 18 years or older and discusses some of the issues surrounding the use of survey methods in describing alcohol problems. This field of study is relatively new. The first detailed studies of alcohol problems in the population as a whole were not undertaken until the mid-1960s, and issues about what is to be measured and how this can best be done are still far from settled. The third section of this paper also reflects some of these concerns.

Coverage in Household Samples

Much of this report is based on the 1979 survey of those 18 years or older living in households within the 48 contiguous States. This means that some segments of the population are not described well or are not described at all in these survey data; for example, people in relatively small segments of the population whose absolute numbers are too small to permit detailed analysis. Thus, some ethnic groups and some religious groups are not well covered because their numbers in the sample are proportional to their numbers in the population as a whole, and are too few a number for detailed analysis. Those not living in households were excluded; thus people on skid row and transients are not covered in this survey. Younger teenagers were not surveyed either, but are discussed in other papers in this report. Those aged 18-20 were included in this national survey and will be discussed below insofar as the limited number of cases in that sample segment permits.

Finally, another group not covered in the 1979 survey is the military, except for those living in households. Fortunately, there are other data that permit a brief description of the military here. There are perhaps 1 million persons in the U.S. military services who are 25 years old or younger (Killeen 1979). Of these, 94 percent are male and 40 percent are single. Blane (1979), Cahalan and Cisin (1975), and Cahalan et al. (1972, 1975) reported that the military contains a somewhat larger relative number of heavy drinkers and drinkers with problems than comparable civilian groups. Blane noted that heavy drinking is most prevalent among those aged 17-20. The rate of heavy drinking remains quite high until age 49, but alcohol-related problems decline in higher age groups.

It is misleading to compare the rates of drinking and drinking problems for military personnel with those of civilians. As Cahalan et al. (1972), Cahalan and Cisin (1975), and Polich and Orvis (1979) made clear, great differences exist within the military in terms of drinking and drinking problems depending upon how that population is divided. For instance, higher ranking enlisted personnel have lower rates of problems than lower ranking enlisted personnel. Officers have lower rates of problems than either low- or high-ranking enlisted personnel, and higher ranking officers have lower rates of problems than lower ranking officers. All this implies that the same status variables that operate in the civilian population—age, education, marital status, etc.—also operate in the military in terms of their association with rates of heavy drinking and most drinking problems. Nevertheless, overall rates of problems are considerably higher in the military than in the civilian population.

Polich (1979) agreed that the military has more than its share of young heavy drinkers and drinkers with problems, but he argued very effectively that it is not necessarily military life that brings this about. If one compares a civilian group with a comparable military group, and standardizes for age, education, and marital status, the difference between the rates becomes quite small. As Polich pointed out, young men are, as a group, relatively heavy drinkers, and whether in the service or not, heavy drinking entails increased risk of developing drinking problems. In the service as elsewhere, these problems can include trouble with authorities, poor job performance, accidents, and problems with friends.

Trends in Alcohol Use and Alcohol Problems

Much concern has been shown for shifts in alcohol consumption and alcohol problems over time. Part of this concern stems from an interest in monitoring changes in the general population and in specific subgroups as a way of validating or invalidating individual information sources, for example, newspaper accounts and cross-sectional studies. Information on trends in consumption and problems associated with alcohol enables prediction of, or at least speculation about, potential problem areas that could be targeted for examination and perhaps intervention.

Though trend analysis is an important method for studying changes in the population, interpretations of such shifts should be made very carefully. As mentioned earlier in this paper, national household surveys omit many subgroups that could influence the findings. Also, national surveys of alcohol consumption and alcohol problems rely on self-reported information. This does not necessarily mean that the findings are invalid, only that they should be interpreted with caution. Finally, comparisons among surveys may be difficult to make due to differences in sampling, survey procedures, and question wording. These factors must be considered when results are being explained.

Despite the difficulties involved, examining trends is an important analytical tool. This section briefly summarizes earlier work in the alcohol field and compares the 1979 national survey with several other national surveys done within a 12-year period. Emphasis is placed on linear trends so that shifts in consumption of alcohol and alcohol problems over time can be assessed.

Earlier Work

Very early survey work done on alcohol usage in the population was focused more on the difference between "drinkers" and "nondrinkers" than on any problems associated with drinking itself. Gallup surveys, perhaps the first to approach the drinking issue on a national level, began in 1939 to poll respondents on drinking with the following question: "Do you have the occasion to use alcoholic beverages such as liquor, wine, or beer, or are you a total abstainer?"

Though the percentage of drinkers, thus measured, increased from 58 percent in 1939 to 71 percent in 1978, these findings alone do not account for the amounts of alcohol consumed, but just reflect the proportion of the respondents who made *any* use of alcoholic beverages. Furthermore, recent surveys that have asked about amounts of alcoholic beverages consumed have not found an increase in the proportion of drinkers. In fact, surveys of drinking practices reflect very consistent findings with respect to abstention rates. Riley and Marden (1947), for example, found that 35 percent of their sample were abstainers. More recent national surveys have reported similar rates (Cahalan 1970; Cahalan and Room 1974; Johnson et al. 1977; Mulford 1964; Room and Beck 1974).

Shifts in per capita consumption can be explained better by changes within drinking patterns. In a detailed analysis of five surveys done between 1964 and 1971, Room and Beck (1974) found that increases occurred more often in patterns that could lead to intoxication than in light drinking patterns. Moreover, these shifts emerged for males only. Johnson et al. (1977), reanalyzing seven national studies funded by NIAAA from 1971 to 1976, also reported an increase in the number of heavier drinking males. They also reported an increase in the proportion of moderate drinking in females aged 35-49 years.

Trends in problems associated with drinking such as cirrhosis will be discussed in other papers in this report. However, trend data are available for alcohol problems based on a "symptoms scale" for studies conducted from 1973 to 1975. Johnson et al. (1977) categorized the proportion of problem drinkers, potential problem drinkers, and drinkers with no problems for four national surveys funded by NIAAA. They found no significant trends during this period.

To determine whether the 1979 national survey reflects any changes in alcohol consumption and alcohol problems, two separate studies were done to look for possible trends in the last 12 years. The first of these studies utilized data from seven national surveys of drinking practices (six funded by NIAAA, one by the National Institute on Drug Abuse) from 1971 to 1976 (reported by Johnson et al. 1977) and compared these consumption patterns with the 1979 survey. In addition, the relationship of drinking patterns to reported symptoms was explored in three of those surveys and was then compared with the 1979 data. The second study is a detailed comparison of the 1979 survey with the 1967 followup of the drinking practices study conducted by the Social Research Group. Comparisons will be made not only on quantity/frequency dimensions but also on the prevalence of problems associated with alcohol.

Trend Study I

To assess the relationship of time trends, social correlates, Johnson et al. (1977) reanalyzed eight national surveys funded by NIAAA (Harris—November 1971, September 1972, March 1973, October 1973, January 1974; Opinion Research Corporation—December/January 1975, June 1975; Response Analysis Corporation—January-April 1976). They concluded that drinking patterns had not really changed very much during the 6-year span. Similar to Room and Beck (1974), they found that abstention rates were fairly stable. Further, Johnson et al. (1977) found that the increase in alcohol consumption as evidenced by beverage sales data was reflected in an increase in heavier drinking among males and a significant increase in moderate drinking among females aged 35-49.

Because the 1979 survey is similar to seven of these surveys of drinking practices just discussed with respect to demographic variables (age, sex, ethnicity, and marital status) and national representativeness, the data can be directly compared with the results obtained by Johnson et al. (1977). The quantity/frequency scale is based on the total amount of ethanol consumed in ounces per day for the last month. (This quantity/frequency scale is based on the last 30 days. This differs from the 12-month quantity/frequency scale used in sections that follow.) The frequency of each beverage type is expressed in fractions of a day multiplied by the ounces of ethanol consumed on a typical drinking day (assuming the ethanol content is 0.04 for beer, 0.15 for wine, and 0.45 for liquor). Different but comparable quantity/frequency scales were derived for two of the surveys and are fully explained in Johnson et al. (1977, appendix B). From the quantity/frequency variable, four categories of drinkers were derived:

abstainer = 0 ounces of ethanol/day;
lighter = 0.01-0.21 ounces of ethanol/day;
moderate = 0.22-0.99 ounces of ethanol/day;
heavier = 1.0 or more ounces of ethanol/day.

This quantity/frequency scale was made comparable across all the national surveys including the 1979 survey.

Comparisons among the surveys shown here should be made with caution. There are several possible sources of variation in findings beyond actual differences in the study populations. Different sampling methods, varying completion rates, different question wording and format can all influence the results, and the magnitude of these influences cannot be known. All these possible sources of variations in findings are present in the data shown below. Further, even the more robust statistical tests of differences of means, proportions, etc., are less powerful when applied to highly skewed distributions such as those dealt with in these data. It is thus prudent to regard small differences between the studies with suspicion. Further protection against being misled can be gained by looking for consistent trends in the data over all the years studied rather than focusing only on pair-by-pair comparisons between two data points. This has been the policy followed in analyzing these data which will be apparent in the conservativeness of the remarks on observed differences among studies in what follows.

Table 1 shows the trends in alcohol consumption by type of drinker. Within each drinker category no significant trend emerges with the inclusion of the 1979 data. Note that the rate of abstention remains approximately one-third of the sample and that the percentage of heavier drinkers fluctuates slightly around 10 percent.

Sex differences in drinking patterns are also presented in table 1. For males, the statistically significant linear trend of increased heavier drinking reported by Johnson et al. (1977) is not supported by the 1979 data. Only 14 percent of the male respondents could be classified as heavier drinkers (the lowest rate for all eight surveys). Similarly, no trends were detected for the female survey respondents. As expected, more women than men are abstainers and lighter drinkers and fewer women are heavier drinkers.

In an effort to examine the effects of age and sex on trends in alcohol consumption, age was categorized into five groups for males and females. Thus, specific trends for drinking types could be studied more fully.

Table 2 shows the relationship of age and drinking patterns for females. In general, the percentage of drinkers is higher in the 1979 study for all age groups compared with the average for the seven studies reported in that table. However, the basic trend for the proportion of drinkers in each age group is similar; that is, the highest percent of drinkers is in the 21-34 age group and it then decreases in each older age category. Although the data from this survey do not generally support the increase over time of moderate drinkers in the 35-49 age group, they do reflect an increase in lighter drinking among older women. Because moderate and heavier drinking among women 65 and over has not changed considerably through the 9-year period and the percent of drinkers has increased, it appears that this increase in lighter drinkers may reflect a shift from nondrinking to drinking status.

Table 1. Trends in Alcohol Consumption by Type of Drinker and by Sex (in Percentages)[1]

	Harris 1971	Harris 1972	Harris Spring 1973	Harris Fall 1973	Harris 1974	Opinion Research Corp. 1975	Response Analysis Corp. 1976	National 1979
Type of Drinker								
Abstainer	36	36	34	37	36	36	33	33
Light	34	32	29	30	28	31	38	34
Moderate	20	23	23	21	28	21	19	24
Heavier	10	10	14	11	11	12	10	9
(*N*)[2]	(2,195)	(1,544)	(1,588)	(1,603)	(1,578)	(1,071)	(2,510)	(1,772)
Males								
Abstainer		30	28	25	26	24	27	26 25
Light		29	29	24	29	24	27	33 29
Moderate		26	28	29	26	34	26	24 31
Heavier		15	15	22	19	18	20	18 14
Females								
Abstainer		42	44	42	47	42	45	39 40
Light		40	34	35	32	32	35	44 38
Moderate		13	18	17	17	21	15	15 18
Heavier		5	4	6	4	5	4	3 4

SOURCE: Adapted from Johnson et al. (1977).

[1] The percentages are weighted figures and may not total to 100 percent due to rounding.

[2] N's presented are the same as in the third Special Report to the U.S. Congress on Alcohol and Health (Department of Health, Education, and Welfare 1978), however, actual N's used in this analysis varied slightly.

[3] Statistically signficant linear trend ($p < .05$), indicating an increase (excluding 1979 Survey).

For males, the 1979 survey shows a substantially higher proportion of drinkers in the youngest (18-20) and oldest (65+) age groups (table 3). More interestingly, the 1979 survey had fewer heavier drinkers than the average of the other surveys for all age groups except the oldest. However, as Johnson et al. (1977) found, no trends can be detected within any of the drinking categories.

Table 2. Trends in Alcohol Consumption for Females in Five Age Groups, 1971-79 (in Percentages)[1]

Drinking Level By Age Group	Harris 1971	Harris 1972	Harris Spring 1973	Harris Fall 1973	Harris 1974	Opinion Research Corporation 1975	Response Analysis Corporation 1976	6-Year Average	National 1979
18–20									
Percentage of drinkers	65	54	60	66	53	—[2]	70	61	69
Lighter	42	35	31	36	32	—[2]	52	38	47
Moderate	18	15	18	24	19	—[2]	16	18	20
Heavier	5	4	11	6	2	—[2]	3	5	4
21–34									
Percentage of drinkers	71	67	62	65	71	68	71	68	77
Lighter	47	37	46	40	36	44	51	43	46
Moderate	18	26	21	22	29	19	15	21	26
Heavier	6	4	5	3	6	5	4	5	5
35–49									
Percentage of drinkers	64	56	63	55	65	57	73	62	65
Lighter	45	38	36	32	34	25	50	37	39
Moderate[3]	14	14	19	17	26	28	19	20	19
Heavier	5	4	8	5	6	3	3	4	8
50–64									
Percentage of drinkers	47	44	43	50	49	48	50	47	49
Lighter	32	28	24	28	27	40	36	31	30
Moderate	10	13	13	18	18	16	11	14	16
Heavier	5	4	5	4	4	1	3	4	3
65 and over									
Percentage of drinkers	26	42	29	28	36	32	37	33	40
Lighter	19	29	19	22	26	23	28	24	31
Moderate	6	8	8	3	7	7	9	7	7
Heavier	0	5	2	2	2	1	0	2	2

SOURCE: Adapted from Johnson et al. (1977).

[1] National 1979 percentages are weighted figures and may not total to 100 percent due to rounding.

[2] Insufficient data.

[3] Statistically significant linear trend ($P<0.05$) excluding 1979 survey.

Table 3. Trends in Alcohol Consumption for Males in Five Age Groups, 1971-79 (in Percentages)[1]

Age Group	Harris 1971	Harris 1972	Harris Spring 1973	Harris Fall 1973	Harris 1974	Opinion Research Corporation 1975	Response Analysis Corporation 1976	6-Year Average	National 1979
18–20									
Drinkers[2]	77	78	86	77	78	—[3]	82	80	95
Heavier drinkers	18	22	31818	28	28	—[3]	20	23	10
21–34									
Drinkers	84	88	85	84	86	89	85	86	84
Heavier drinkers	20	17	26	20	21	28	21	22	19
35–49									
Drinkers	73	76	78	82	80	75	75	77	73
Heavier drinkers	18	19	25	22	21	20	19	21	16
50–64									
Drinkers	65	64	68	65	72	67	69	67	69
Heavier drinkers	16	13	14	29	15	21	22	17	11
65 and over									
Drinkers	54	45	46	53	54	36	51	48	59
Heavier drinkers	6	6	14	12	5	6	2	7	8

SOURCE: Adapted from Johnson et al. (1977).

[1] National 1979 percents are weighted figures.

[2] Data for lighter and moderate drinking categories not available.

[3] Insufficient data.

The analysis of time trends for problems related to drinking was more of a problem for the 1979 survey because most items that made up the "problem scales" for the other surveys were not comparable. However, three items derived from the symptoms scale of the Harris 1973 and 1974 surveys and the Opinion Research Corporation 1975 survey were included in the 1979 survey. (This symptoms scale should not be confused with the alcohol dependence scales used elsewhere in this paper.) The symptoms include gulping drinks, taking a drink in the morning to relieve a hangover, and forgetting what one did while drinking. Though these items are only three of many questions used in drinking practices surveys to reflect potential or actual problems with alcohol, there are strong indications that they represent important dimensions of alcohol problems. Polich and Orvis (1979) factor analyzed five categories (32 items) of alcohol problem measures based on their sample of U.S. Air Force personnel. Tremors, morning drinking, impaired control, and blackouts loaded heavily on the same factor as did intoxication indicators. This suggests that the three items used for this analysis are strongly related to other alcohol problem indicators—specifically those relating to excessive alcohol use.

Table 4 shows the findings of the 1979 survey compared with the findings of the three other surveys for categories of drinkers reporting any of the three symptoms just described. Note that for the total samples as well as for males and females the proportion reporting any symptom increases with the amount of alcohol consumed. In addition, relatively more males than females reported symptoms for every category of drinker, with the exception of lighter drinkers in the Harris 1974 survey and moderate drinkers in the national 1979 survey. Finally, there is no consistent trend of symptoms reported over time with respect to any of the drinking categories for either males or females. If overall rates of drinkers who report any of the three symptoms are compared among the studies in table 4, rates of problems among drinkers are fairly stable (ranging from 23 to 32 percent).

Table 4. Type of Drinker Reporting Any Symptom for Males and Females (in Percentages)[1]

	Harris		Harris		Opinion Research Corporation		National	
1973	1974		1975		1979			
Sample	Percent	*N*	Percent	*N*	Percent	*N*	Percent	*N*
Total								
Lighter	15	470	11	443	11	349	14	593
Moderate	39	369	26	436	37	238	26	408
Heavier	55	212	55	166	71	108	42	165
Males								
Lighter	22	190	10	186	19	129	22	214
Moderate	46	229	34	262	41	151	27	227
Heavier	61	170	57	129	74	87	44	119
Females								
Lighter	10	280	12	257	7	220	10	379
Moderate	28	140	15	174	31	87	25	181
Heavier	33	42	49	37	62	21	35	46
Total Drinkers (*N*)	32	1,051	24	1,045	29	695	23	1,166

[1] National 1979 percentages are weighted figures. Totals shown are the actual number of cases. These totals occur because of nonresponse, etc.

Readers who are familiar with the *Third Special Report on Alcohol and Health* (U.S. Department of Health, Education, and Welfare 1978) will recall the rates of alcohol problems based on a scale of 16 symptom items reported for four drinking practices studies funded by NIAAA (Harris—March 1973, January 1974; Opinion Research Corporation—January 1975, June 1975). In this report, Johnson et al. (1978) reported that approximately 25 percent of all drinkers were considered to be "potential problem drinkers" while a range of 6 to 11 percent of all drinkers were labeled "problem drinkers." (A *potential* problem drinker experienced 2 or 3 of 16 problem-drinking symptoms frequently or 4 to 7 symptoms sometimes. A problem drinker experienced 4 or more of 16 problem-drinking symptoms frequently or 8 or more symptoms sometimes.) The 16-item scale used by Johnson et al. (1978) in their analysis included items that varied in their severity, e.g., talking a lot about drinking, taking a drink at lunchtime. When the more severe "symptoms" of alcohol problems are taken out of that scale and compared with the 1979 national survey (table 4), there is no evidence of an increase or a decrease in the prevalence of alcohol problems among drinkers.

Because this study is limited to the three symptom items commonly used in the studies, it was not possible to assess differential reporting rates among several types of problems. However, a comparison of the 1979 survey with an earlier version of the survey provides an opportunity to compare reporting rates for nine problem areas associated with alcohol use.

Trend Study II

During 1964-65, the Social Research Group conducted a national survey of drinking practices and related attitudes using a sample of 2,746 respondents representative of the national adult population residing in households. Two years later, a subsample of these were reinterviewed—1,359 of the original respondents. Unlike the first study, the 1967 survey included information on several areas of alcohol problems. Because many of the items in the 1967 and 1979 interviews are comparable, a more detailed analysis of drinking types and alcohol problems can be done. Comparisons between the 1967 and the 1979 studies will be made for drinking patterns and alcohol problems separately and for reports of specific alcohol problems within drinking categories.

It should be noted that comparisons made between the 1967 and 1979 surveys may be problematic because the former was a followup study and thus the data may be subjected to biases due to nonresponse. However, a detailed analysis of the noninterviewees in the 1967 study (as compared with respondents in Stage I—1964-65 study) done by Cahalan (1970) indicates that "the differences were found not to be of any practical consequence in this particular study" (p. 174).

Quantity/Frequency of Drinking: 1967 Compared with 1979 As discussed previously, the earliest surveys of drinking practices in general populations, e.g., the Gallup polls beginning in 1939, asked respondents only enough to classify them either as total abstainers or as users of any alcoholic beverage. In the years since, measures of amount of drinking have become more complex, asking quite detailed questions about the frequency of drinking various kinds of beverages and about quantities consumed. For both the 1967 and 1979 national surveys, respondents were asked the frequency of drinking wine, beer, and distilled spirits separately, and a series of questions about the quantities of each consumed. To ensure comparability between scales, the following categories of drinkers were derived:

Abstainers—those who drink no alcoholic beverage or drink less than once a year.

Lighter Drinkers—those who may have three or four drinks on occasion of one beverage type—wine, beer, or distilled beverage—but who never have more than one or two drinks per occasion of the other two beverage types. Lighter drinkers report that they drink on fewer than 10 occasions per month.

Moderate Drinkers—includes three distinct types:

—those who never have more than three or four drinks per occasion of only one beverage (as is the case for light drinkers) but who do have more than 10 drinking occasions per month.

—those who may drink five or more drinks per occasion of only one beverage type, never having more than three or four of the other two beverages regardless of the number of drinking occasions per month.

—those who drink five or more drinks of at least two beverage types, but who report fewer than 10 drinking occasions per month.

Heavier Drinkers—those who sometimes drink five or more drinks per occasion of at least two beverage types *and* who report that they drink on at least 10 occasions per month.

The scale derived for comparability of quantity/frequency measures was based on items that differ from the quantity/frequency scale discussed in the Trend I study. Even though the labels used for describing drinking patterns are the same, the scales should not be compared directly.

Table 5 shows the frequency distribution of drinking types in both surveys for males and females. The 1979 survey reflects similar percentages of drinking categories with slightly more abstainers and moderate drinkers and slightly fewer lighter drinkers. Note that the tendency for more people to report no alcohol consumption for the last 12 months in the 1979 survey is similar for males and females.

Definitions of Drinking Problems. Because both national surveys had similar problem measures, data were compared on nine problem scales for males and females (table 6). A positive score on any scale indicates that respondents reported that any item on that scale happened to them within the last 12 months. This differs for the problems with spouse scale, which will be explained as follows.

- Health problems. Respondents who reported that drinking had been harmful to health and/or that a physician had advised them to cut down received a positive score on the health scale. Although the differences are not very large, fewer men and women reported any health problem connected with drinking in 1979 compared with 1967.
- Belligerence associated with drinking. The proportion getting into a heated argument after drinking, as an indicator of belligerence, is slightly higher for respondents in the 1979 survey (4 percent

Table 5. Type of Drinker by Males and Females for the 1967 and 1979 National Surveys (in Percentages)[1]

Type of Drinker	National 1967 Percent	National 1979 Percent
Total		
Abstainers	29	33
Lighter	32	25
Moderate	32	35
Heavier	7	7
(N)	(1,358)	(1,758)
Males		
Abstainers	20	25
Lighter	23	20
Moderate	44	44
Heavier	13	12
(N)	(751)	(755)
Females		
Abstainers	36	40
Lighter	39	31
Moderate	24	27
Heavier	2	3
(N)	(607)	(1,003)

[1] The percentages are weighted figures and may not total to 100 percent due to rounding. Totals shown are the actual number of cases. Slight variations in these totals occur because of nonresponse, etc.

and 6 percent, respectively). However, this difference is more apparent for males than for females.

- Problems with friends. Friends suggesting that the respondent cut down on drinking was experienced by very few respondents in both surveys (1 percent and 2 percent, respectively). As noted by Cahalan and Cisin (1976), problems with friends may be rare because heavier drinkers tend to associate with people who condone their drinking behavior.
- Symptomatic drinking. Items within this scale refer to signs of physical dependence and loss of control suggestive of Jellinek's *gamma* alcoholism. Specifically, these areas include drinking to get rid of a hangover, having difficulty stopping drinking, having blackouts or lapses of memory, skipping meals while drinking, tossing down drinks quickly to achieve a quicker effect, sneaking drinks, and drinking before a party to make sure one has had enough alcohol. For the total samples, reports of symptomatic

behavior increased in the 1979 survey (from 8 percent to 14 percent). For males, this increase was dramatic, with reports of symptoms increasing from 11 percent to 20 percent. Less of an increase was found for females in the 1979 survey.

- Psychological dependence. Drinking to alter a mood (to help nerves, to forget, to forget worries, to cheer up, to relieve tension and nervousness) comprises the psychological dependence scale. It should be noted that the psychological dependence scale as defined here was a much more relevant concept in 1967 than it is now. Previously in the alcohol field there was a strong belief that "needing to have a drink to alter one's mood" was an indicator of dependence, and was therefore "negative." Even though this scale is not considered to be as important in current alcohol research, it will be retained for this analysis. A comparison of the psychological dependence scale between the two samples shows that, in 1967, 37 percent of the total sample reported having had at least one of these experiences in the last 12 months. In 1979, fewer respondents (21 percent) reported any positive response to this scale. This decrease is evidenced by both males and females; however, males reported higher rates of drinking to change a particular mood.

Table 6. Prevalence of Problems Associated with Drinking in the Past 12 Months for Males and Females in the 1967 and 1979 National Surveys (in Percentages)[1]

	National[2] 1967			National[2] 1979		
Problem Area	Male	Female	Total	Male	Female	Total
Health problems	6	5	5	4	2	3
Belligerence associated with drinking	5	3	5	8	4	6
Problems with friends	2	—[3]	1	3	1	2
Symptomatic drinking	11	5	8	20	9	14
Psychological dependence	49	29	37	26	17	21
Job problems	3	2	2	7	2	4
Problems with the law, police, accidents	1	—[3]	—[3]	2	1	1
Binge drinking	1	—[3]	1	1	—[3]	1
Problems with spouse	1	0	1	2	—[3]	1
(N)	(751)	(608)	(1,359)	(762)	(1,010)	(1,772)

[1] The percentages are weighted figures. Totals shown are the actual number of cases. Slight variations in these totals occur because of nonresponse, etc.

[2] Last 2 1/2 years for National 1967; last 3 years for National 1979.

[3] Less than 0.5 percent.

This increase in symptomatic drinking and decrease in psychological dependency is a curious finding and deserves further discussion. One explanation for an increase in reports of more "serious" symptoms may be a general sensitization of the public concerning "signs" of alcohol problems. Many mass media campaigns have been implemented in recent years (1967-79) which have alerted the public to the "warning signals" of problems related to alcohol use. Perhaps respondents in the 1979 survey are better able to identify and label alcohol-related problems than the earlier respondent group. The decrease in reports of psychological dependence items (drinking to change one's mood) can imply many things. It may be that respondents in 1979 no longer feel the need to "justify" their drinking; that is, they may not need a reason to drink, such as "feeling tense or nervous." One could argue that drinking as a social activity has become more integrated into American society and has thus taken on a more neutral position. Another possibility is that more people have found alternative ways to handle their undesired moods. These hypotheses, however, will need to be explored more fully. In any event, an increase in one measure and a decrease in another without any other corroborating information does not enable us to draw any conclusions concerning possible changes in rates of alcohol problems in the two study populations.

- Job problems. Five items describe problems associated with the job that directly relate to alcohol use: having lost or nearly lost a job because of drinking; having coworkers suggest that one cut down on drinking; feeling that drinking may have hurt chances for promotions, raises, or better jobs; staying away from work or going to work late because of a hangover; and getting high or tight while on the job. The prevalence of job problems in both surveys is low (2 percent in 1967 and 4 percent in 1979). The slight increase for the total samples is reflected in the male respondents (from 3 percent to 7 percent).
- Problems with the law, police, and accidents. This scale is composed of four questions concerning arrests for drunk driving, arrests for being drunk, being in an accident in which the respondent was hurt, and being in an accident in which someone else was hurt or property was damaged. Less than 1 percent of the 1967 sample and 1 percent of the 1979 sample reported problems in this area.
- Binge drinking. Related to Jellinek's concept of loss of control, this scale measures the prevalence of being intoxicated for several days at a time at least once in the last 12 months. Very few respondents in either survey (1 percent for both) can be characterized as binge drinkers.
- Problems with spouse. This scale refers to having had a spouse leave or threaten to leave the respondent because of drinking in the last 2 1/2 years for the 1967 survey or in the last 3 years for the 1979 survey. Very few people interviewed for either the 1967 or 1979 survey reported such an occurrence (1 percent for both).

In order to examine the relationship between problem scales and drinking patterns, reported rates for the problem measures are presented for each drinking category for males and females for both surveys (table 7).

For males and females in both surveys there is a positive relationship between problems reported and alcohol consumed. This association is especially apparent in the 1967 survey for both the psychological dependence scale and the symptomatic drinking scale. Ninety-six percent of the women and 83 percent of the men who are heavier drinkers reported that they used alcohol to change their mood at least once in the last 12 months. These rates are considerably lower in the 1979 survey (51 percent and 47 percent, respectively) but are still substantial. In contrast, reports of symptoms by heavier drinkers increased in the 1979 survey for both males and females.

Interpretations of these shifts must be made carefully. For although there are higher rates of reporting alcohol problems for heavier drinkers, a fairly substantial proportion of lighter drinkers also scored positively on the psychological dependence measure (1967: males—39 percent, females—28 percent; 1979: males—13 percent, females—18 percent). In addition, since we were only sampling at two points in time, it is impossible to state that a trend has emerged by the findings in these surveys alone.

A Summary Note on Trends

Our purpose in comparing the 1979 survey findings to earlier work was, of course, to see whether or not there had been any marked changes in alcohol use or alcohol problems over the intervening dozen or so years. In our judgment, the results of the comparisons do not indicate that any clear changes in alcohol use or rates of problems have occurred. The percentage of drinkers versus abstainers is quite stable over the studies, and the proportion of heavier drinkers has not changed in any way that suggests a trend. We do not conclude from this apparent lack of change that a long-term pattern of stability will extend into the future. Past decades have seen changes in the proportion of drinkers in the population and in the per capita consumption of alcoholic beverages. What we have done in the 1979 survey is to add one further data point in the process of monitoring the level of alcohol consumption in the household population.

Further, substantial changes in alcohol use may have taken place in some subgroups of the population that were not detected in analysis. Any such changes in subgroups would have to have been concealed by an opposing change in another group, of course, or the net change would have been seen in the aggregate data.

Perhaps most important for an understanding of the nature of drinking problems, we have seen in these data that the relationships

Table 7. Prevalence of Problems Associated with Drinking in the Past 12 Months and Types of Drinkers for Males and Females in the 1967 and 1979 National Surveys (in Percentages)[1]

		National 1967			National 1979	
Problem Area	Lighter	Moderate	Heavier	Lighter	Moderate	Heavier
Males						
Health problems	5	8	15	0	5	11
Belligerence associated with drinking	2	4	18	1	9	32
Problems with friends	—[3]	2	8	184	7	
Symptomatic drinking	2	11	46	2	26	67
Psychological dependence	39	66	83	13	40	46
Job problems	—[3]	3	10	2	7	26
Problems with the law, police, accidents	—[3]	2	0	0	2	6
Binge drinking	0	1	2	0	1	2
Problems with spouse[2]	–[3]	1	6	1	4	5
(*N*)	(153)	(312)	(111)	(140)	(323)	(92)
Females						
Health problems	6	9	11	2	4	9
Belligerence associated with drinking	1	7	29	1	12	27
Problems with friends	0	1	11	1	3	2
Symptomatic drinking	1	14	42	4	22	54
Psychological dependence	28	66	96	18	43	51
Job problems	0	5	20	1	4	18
Problems with the law, police, accidents	0	—[3]	0	0	2	8
Binge drinking	0	1	2	0	1	2
Problems with spouse[2]	0	0	0	0	0	4
(*N*)	(241)	(187)	(22)	(304)	(264)	(32)

[1] The percentages are weighted figures. Totals shown are the actual number of cases. Slight variations in these totals occur because of nonresponse, etc.

[2] Last 2 1/2 years for National 1967; last 3 years for National 1979.

[3] Less than 0.5 percent.

between amount of drinking and rates of most of the various alcohol problems have remained fairly stable from study to study. Those changes that were observed, such as the increase in symptomatic drinking, were balanced against an apparent decrease on a measure of psychological dependence on alcohol. As noted, this remains a question without an answer. Thus, again, we must conclude that we have detected no clear trends in rates of alcohol problems in the data.

The 1979 National Survey

The 1979 national study of alcohol use builds on earlier studies commissioned by NIAAA to monitor alcohol use, alcohol problems, and their correlates. The NIAAA required a research design that would enable researchers to project findings to the larger population. Thus a probability sample was designed to represent adults aged 18 years or older living in households in the contiguous States. Interviews were conducted with 1,772 respondents, 71 percent of those eligible. Males made up 43 percent of those interviewed, females 57 percent. A fairly complex weighting scheme was applied to the data to facilitate projections to the whole population: age, sex, education, number of eligible adults per household, and completion rate of interviews in each area of the country were taken into account in assigning weights to the completed interviews. (Percentages reported in the tables are based on weighted data, but the totals given are unweighted, and most of the statistical analyses have been performed on unweighted data.)

Almost all interviews were conducted in respondents' homes. Interviewers read questions to the respondents and recorded their answers on standardized questionnaires. The average time per interview was approximately 1 hour. The sample design and the field work were carried out by the Response Analysis Corporation of Princeton, N.J.

Describing the patterns of alcohol use and alcohol problems in the U.S. population requires operational definitions of concepts such as "heavy drinkers" and "alcohol dependence." Researchers are not in full agreement about such matters, and some of the disagreements have implications for prevalence rates and for what the rates may mean. A brief review of some of these issues may remind us that difficulties in quantifying concepts in the alcohol field are reflected in this study.

One must keep in mind that these data are not direct measures of such things as alcohol dependence, loss of control, etc. Rather, they are respondents' reports of their experiences with alcohol use. These variables do fit into patterns that make sense both for individuals and for the drinking population as a whole. However, the reported rates of various problems due to drinking are not objective measures of respondents' "conditions," but are their evaluations of what they have experienced.

Indications of Addiction or Dependence

It is not known whether the self-reported signs of possible addiction such as tremors and blackouts are only fairly short-term physiological consequences of a heavy drinking bout or whether they are signs of a lasting physical change. That change, some authorities believe, includes something that makes it less likely that the drinker will thereafter be able to abstain from drinking or to exercise control over drinking. Keller (1972, 1976, 1977) argued for this. It is often suggested that some such change underlies the alcoholics' frequent reports of craving for alcohol. The evidence to settle this dispute is not yet at hand and opinions will probably remain divided for some time to come.

Alcohol withdrawal symptoms are demonstrable, of course; and alcohol addicts who are deprived of alcohol after a heavy binge may display withdrawal symptoms which sometimes include delirium tremens. A subacute form of this withdrawal syndrome may include blackouts, the shakes, sleep disturbances, and morning drinking. Gross (1977) contains an excellent review of the physical evidence on the alcohol dependence syndrome. In this article on the alcohol dependence syndrome and related matters, Gross states that the appearance of withdrawal symptoms and, to a lesser degree, the severity of the symptoms is very roughly related to the amounts of alcohol consumed and to the length of the drinking bout. Why only "roughly related" is not yet clear, but even when researchers controlled the amount consumed and the schedule of drinking, some subjects did not experience the syndrome. In animal experiments where alcohol intake was by means of inhaled vapor rather than by oral administration, the relationship between drinking and the appearance of the syndrome was much more clear. Gross and others feel that there is more to be learned about this but that the basic relationship between drinking and the withdrawal syndrome is well founded on experimental evidence.

Edwards et al. (1977) contains the argument, with which many others agree, that impaired control over drinking reported by alcoholics is supported by these data. This conception of alcohol dependence as a condition with a range from low to high is very different from the older conception of physical dependence as either present or absent. Polich et al. (1980) and Polich and Orvis (1979) made this conception a central element in their impressive survey work on treated alcoholics in the first study and on U.S. Air Force personnel in the second. Yet, other researchers are not wholly convinced of the usefulness of giving such a central position to the concept of alcohol dependence as inferred from blackouts, tremors, etc. Clark (1976), Room (1977), Roizen et al. (1978), and Shaw (1979) all find reason to withhold complete assent to the adoption of the conceptual scheme presented by Edwards et al.

The dependence symptoms themselves do exist, of course, and reports of these in cross-sectional studies are strongly related both to heavy drinking and to such drinking problems as marital discord and poor job performance. Cahalan (1970) presented quite similar data for the U.S. population as a whole. But as Room (1977) pointed out, the chance exists that the so-called symptoms are only short-term physical consequences of heavy drinking bouts and thus are an alternative way of measuring heavy drinking. That is, they need not indicate a lasting physical change that impairs drinkers' control over drinking in the future.

There is also the possibility that the symptoms are overreported. Jellinek (1960), in his seminal work on the nature of alcohol problems, suggested that some alcoholics conform more in their language than in fact to some alcohol-related problems. Clark (1975) also argued that these very widely known subacute signs of alcohol dependence are subject to overreporting among drinkers who have decided that their drinking is a problem.

It is also the case, however, that reports of dependence at one time are reasonably good predictors of alcohol problems in the future. Polich et al. (1980) found this to be true of their alcohol treatment clients over the course of a 4-year longitudinal study. Clark (1976), in a longitudinal study of San Francisco's general population over a similar timespan, found a weaker, but still observable, relationship between symptomatic drinking at one time and continued alcohol problems 4 years later.

Again, this does not settle the matter. Even though the existence of dependence symptoms at one time in longitudinal studies is a moderate-to-good predictor of other drinking problems 4 years later, the dependence symptoms themselves are unlikely to be reported as continuing over that time. Cahalan and Room (1974) found that 63 percent of "symptomatic drinkers" (as dependence is called in that work) were not symptomatic when reinterviewed 4 years later, even though a majority of them still had some kind of drinking problem. Clark (1976), in the San Francisco study referred to above, found a remission rate of 57 percent in a 4-year longitudinal study. Roizen et al. (1978) also reported a similar conclusion from an analysis of those same data. If dependence symptoms are an underlying cause of, say, continuing heavy intake, why do they not persist? The investigators just discussed believe that assigning reports of dependence a central position in epidemiological studies is premature, because dependence, thus measured, seems to vary over time as do other kinds of drinking problems.

Also, dependence symptoms are found most frequently among young male drinkers and less often among middle-aged males who make up the bulk of clinic patients (Cahalan 1970; Cahalan and Room 1974; Polich and Orvis 1979). We infer from cross-sectional data that most of these young dependent drinkers get out of trouble within a few years, perhaps in their late twenties or early thirties. Possibly, dependence symptoms in youth do not have the same meaning as they do for clinical alcoholics in the mid-life years. Or perhaps the clinic populations discussed in Polich et al. (1980) are different in some unknown way from dependent drinkers in the general population who got out of trouble. Room (1977) remarked that general population findings and clinic study results differed enough to seem like "two different worlds."

Thus these remain matters on which there is much disagreement. There is ample reason to continue to study the relationships among drinking, dependence, and other alcohol-related problems. Perhaps we should study the age group between 25 and 35 years, for that seems to be the period when most young drinkers with problems resolve them. Those who do not may be on their way to progressively worse drinking experiences. A longitudinal study focusing on this age group might be helpful in understanding this process.

Lost or Impaired Control Over Drinking

Contained in the concept of alcohol dependence is the idea of lost or impaired control over drinking following the appearance of the indicators of dependence previously discussed. Keller (1972, 1977) argued that impaired control is the sine qua non of alcoholism and that it refers to alcoholics' inability to be sure that if they begin to drink they can stop before becoming intoxicated. Alcoholics commonly report craving alcohol or craving intoxication, and these cravings can be construed as indications of impaired control. (In survey studies, reports of loss of control are often combined with symptoms such as tremors and blackouts, as indicators of alcohol dependence—e.g., Cahalan 1970; Cahalan and Room 1974; Knupfer 1967; Mulford and Miller 1960; Polich and Orvis 1979.) As with measures of dependence discussed above, reports of inability to control drinking are correlated with heavy drinking and with a host of other alcohol problems. But the conceptualization and its measurement in epidemiological work are not as clear as one might wish. These reports of lost or impaired control are respondents' reports of their feelings and are not measurable by "outside" indicators. Room (1977), Clark (1975, 1976), and Roizen et al. (1978) are among those who feel that giving these reports great emphasis is premature.

There is a good deal of evidence from behaviorists' studies to indicate that alcoholics' reports of craving and loss of control are not necessarily concomitants of "taking that first drink," or even follow from reaching a certain level of blood alcohol. In a review of the literature on this subject, Paredes et al. (1977) found 56 studies indicating that "chronic alcoholics can and do engage in limited non-problem drinking without encountering deleterious consequences." They cited evidence to the effect that alcoholics who erroneously thought they had been given alcohol were more apt to report subjective feelings of lost control than were alcoholics who were told they had not been given alcohol when in fact they had (Mendelson and Mello 1979; Nathan et al. 1978; Sobell and Sobell 1978). Thus some researchers feel that a subjectively felt craving may be something other than a response to internal physiological mechanisms. This, of course, does not mean that reported craving and loss of control are unimportant in studies of alcohol use and alcohol-related problems. It may be fair to say that researchers do not agree on the conceptual place indicators of lost control should be given in our studies.

Psychological Dependence

A similar situation exists—perhaps more in the past than today—with respect to the "personal effects" reasons for drinking, which include such things as "drinking when tense and nervous" or "drinking to forget my worries." These have a long history; perhaps the first use was by Riley et al. (1948). Nearly every survey of general populations has used something similar in the intervening years. Here again we have a concept that has its roots in common experience among drinkers with the implication that drinking "because you need a drink" is a bad sign. As Room (1977) noted, the underlying idea is quite closely related to psychiatric conceptions of neurotic drinking, but these particular items have not been validated for such use, and quite possibly cannot be.

It is true, however, that positive responses to questions about "drinking to escape" are associated with heavy drinking and to problems due to drinking as well. Interestingly, as Polich and Orvis (1979) convincingly showed by means of a factor analysis, these "escape" items are not clustered with the dependence syndrome items previously discussed, even though they also are moderately related to drinking problems. In our opinion the notion of "escape drinking" as an indicator of severe alcohol problems should be scrapped; scales for apparent loss of control over drinking and apparent alcohol dependence will serve the same analytic purpose more efficiently.

With respect to indications of alcohol dependence, loss of control over drinking and psychological dependence in survey data, we have tried to explicate the differences of opinion that exist concerning the proper use of these concepts and their indicators. We believe that we should measure the prevalence and distribution of these indicators, but their interpretation requires further study. In the paragraphs below we will discuss several other commonly measured aspects of drinking and alcohol problems, such as amount of drinking and adverse consequences of drinking, which are not as controversial—although there are differing opinions on the most useful ways of measuring them. Such disagreements are no doubt part of the reason why there still is no standardized instrument for the measurement of alcohol use and alcohol-related problems in either clinic populations or general population samples.

Measures of Amount of Drinking

A good description of an individual's pattern of drinking alcoholic beverages might reasonably include, for some specified period, the frequency of drinking various alcoholic beverages, the quantities of each taken on each drinking occasion, and the kind of alcoholic beverage. [Room's (1977) discussion of these problems and techniques used in various surveys is instructive.] Combining this complexity of behavior with the practical necessity of devising a fairly simple summary measure for frequency and quantity of drinking means that some information must be sacrificed in the interest of simplicity.

The 1979 national survey asked quite detailed questions about frequency and quantity of drinking, "over the last 30 days" and, in greater detail, "during the last 12 months." In the preceding discussion of trends in consumption, we had to use an extremely simple measure of drinking in order to make comparable scales of frequency and quantity across a number of surveys that asked very different questions. Below we will use a fairly complex index of amount of drinking, one which takes into account three types of alcoholic beverages, a broad range of drinking frequencies, and extremely high categories for quantities drunk.

Measures of Drinking Problems

Recent survey studies, including the 1979 national survey, have typically asked respondents about various kinds of problems their drinking may have caused them, e.g., interpersonal problems, arrests for drunk driving, financial problems from spending too much on drinking, problems at work due to drinking, any health problems due to drinking that the respondent may know of or suspect. An important issue, however, is determining what sorts of things qualify as drinking problems. Clearly there is some arbitrariness in these matters, but Knupfer's (1967) broad definition of "any problem fairly closely related to drinking" will suffice for present purposes. It must be made clear that we are dependent upon the respondents' judgments in most of these matters; if they say their problem is due to drinking, it is counted as such. Although some authorities, including Keller (1962), have suggested that reports of drinking problems could be used to infer alcohol addiction, few survey researchers today do so. Instead, the problems are taken at face value and rates of various problems are described in usual epidemiological fashion. Kreitman (1977) contains a wry overview of this process.

The problem of what gets counted as a problem also involves decisions concerning how recent and how severe a problem must be, because it will make a big difference in the projected prevalence rates. However, since most research reports provide details on how these categories were constructed, the problem is not as great as it might otherwise be, and in fact the literature reflects a fair measure of similarity across studies in these measures (though seldom enough similarity to permit direct statistical comparison). Those interested in the history of this part of survey research might read Room (1977). Polich and Orvis (1979) also contains a discussion of the meaning of these problem scales together with an exemplary analysis of their relationship to amount of drinking and indications of alcohol dependence.

An Overview of Alcohol Use and Alcohol Problems in the U.S. Population

This section presents a sketch of alcohol use and some lesser levels of alcohol problems found in various segments of the population. The emphasis here is on variations in drinking and problems among different subgroups, not on the rates of more severe (and much more rare) problems due to drinking. The latter will be discussed subsequently.

Here we must introduce a measure of the amount of drinking that is entirely different from either of the two used in the Trends sections above. Unlike the measure used by Johnson et al. (1977), which categorized typical amounts of alcohol drunk in the past 30 days, the measure introduced here accounts for larger than usual amounts of alcohol drunk on occasion as well as typical amounts, and the period of time accounted for is 12 months (see Trend Study I section). The measure of amount of drinking to be used in this section also differs from that used in Trend Study II above in several ways; perhaps most important, this new measure accounts for much larger quantities drunk on occasion. The measures of amount of drinking constructed for the Trend analysis were constrained by the need to derive comparable measures from rather different questions.

The measure of amount of drinking, the *quantity/frequency scale*, used in this section is measured by the combined number of drinks per month of beer, wine, and distilled drinks. Beginning with the largest amount of each beverage the respondents could recall drinking on an occasion during the past 12 months, we asked the frequency of drinking that large a quantity and all lesser quantities down to the minimum frequency of drinking one or two drinks per occasion. (Details on scale construction can be obtained from the authors.) This quantity/frequency scale of drinking has the great advantage of being readily understood and of placing all cases on a continuum of consumption ranging from 0 to 600 drinks per month. The greatest disadvantage of this measure is that it combines people who drink the same number of drinks per month but who may, in fact, drink in greatly differing ways. Thus, the drinker who has 2 drinks per night for a week is categorized with the drinker who has 14 drinks on one night. Knupfer (1967) has shown that for some purposes this collapsing of disparate patterns should be avoided. See also Cahalan et al. (1969) for a discussion of massed versus spaced drinking. Below, in a section on "Alcohol Dependence, Loss of Control, Amount of Drinking, and Drunkenness," the effects of episodes of intoxication on problem-drinking scores are explored. Here a simpler measure of amount of drinking is preferred for broad comparisons among population segments.

Initially, we divided the data on alcohol use over the past 12 months into these three categories:

- Those who have used no alcoholic beverages during that time.
- Those who have reported drinking up to 60 drinks per month.
- Those who have reported drinking 60 or more drinks per month.

Also in this section we will use two measures of problems related to drinking. These problem scales contain very real problems, as will subsequently be apparent, but, as previously discussed, they should not be taken as direct indicators of rates of alcoholism. Fairly low cutting points in the total range on each score were chosen here to illustrate the variations across groups.

The social consequences scale includes reports that in the past 12 months one or more of the following events due to drinking took place:

- A spouse, a friend, or a relative of the respondent either threatened to break off the relationship, or actually did so, because of the respondent's drinking, or friends advised the respondent to cut down on drinking.
- Police questioned or warned the respondent about drinking; or the respondent was arrested for drunkenness or drunk driving.
- Drinking contributed to the respondent's being involved in an accident (automobile or other) in which someone was hurt or property was damaged.
- People at work indicated that the respondent should cut down on drinking, or the respondent felt that drinking had cost him or her a chance at a raise, a promotion, or a better job; or the respondent had lost a job, or nearly lost one, because of drinking.

The alcohol dependence scale here refers to a report of at least two different symptoms from the following list in the past 12 months:

- skipping meals when drinking,
- sneaking drinks,
- morning drinking,
- drinking before a party to ''get enough,''
- blackouts,
- gulping drinks,
- hands shaking after drinking,
- morning drinking to get rid of hangover.

Note that this scale is not identical to the symptoms scale discussed in the section on trends. Rates based on the two are not comparable even though some of the same items are used in both scales. The cutting point of two or more of the above is an arbitrary one.

The loss of control scale here means reports during the past 12 months of one or more of the following:

- fear that one was alcoholic;
- attempts to cut down or quit drinking, but being unable to do so;
- sometimes kept on drinking after promising not to;
- found it difficult when drinking to stop before becoming completely intoxicated.

For convenience, the loss-of-control scale and the dependence scale have been combined in the accompanying tables; positive responses to either or both scales are tabulated together. We have deliberately chosen to use quite low cutting points for both the loss-of-control and the dependence scales in this section. Doing so will illustrate that low levels of both phenomena can be found in nearly all segments of the population. Obviously, inclusion at this low level does not imply anything like clinical alcoholism. In a later section, we will use more stringent criteria for inclusion on these scales and show how these higher levels relate to alcohol consumption.

Table 8 presents the rates of the scales on amount of drinking and alcohol problems within categories of sex and age. First note that abstention is not uncommon in the U.S. population; 33 percent of the total, 25 percent of males and 40 percent of females, did not use alcohol in the 12 months preceding the interview (and recall that these figures have not changed greatly in recent years). Table 8 indicates what has been found in numerous surveys—the proportion of abstainers is greater in older age groups than in younger and is relatively more common among women than among men.

Heavier drinking (table 8, column 3) shows the relative proportions differing as expected. Young men include relatively more heavier drinkers in their number than older men. Among women, the same pattern may be seen, but in an attenuated form. Note that the rates of social consequences and the rates of loss of control or dependence follow the same pattern; males more than females and the young more than the old report these alcohol problems. Blane (1979) contains a discussion of this often observed pattern and other general population surveys also support these findings (Cahalan 1970; Cahalan and Room 1974). The idea that most kinds of alcohol problems are most common among the middle aged is not supported by general population studies, although that is found in studies of clinic populations.

The right-hand column of table 8 contains the percentage of *drinkers* in each age and sex category who reported some degree of loss of control or dependence in the past 12 months. This has the obvious effect of increasing the percentages in all categories in proportion to the number of abstainers in the particular group. The group of women aged 18-20 years show the effect of percentaging on drinkers most markedly; nearly one-fourth of the drinkers in this group reported at least mild levels of dependence or trouble controlling drinking by these measures, a proportion which is exceeded by only three of the male age groups and by none of the other female age groups.

In table 9 the amounts of drinking and problem scales are displayed within categories of marital status. Compared with the married and widowed, the divorced, separated, and never-married males have the larger proportions of heavier drinkers and the larger proportions of

Table 8. Drinking Patterns and Drinking Problems in the U.S. Adult Population by Age (in Percentages)[1]

	Drinking Categories					Total	Percent Based On Drinkers Only
Age	A	B	C	D	E	*N*	E
Males							
18–20 years	5	79	17	15	35	37	37
21–25 years	10	54	36	13	25	82	28
26–30 years	20	50	29	10	25	87	32
31–40 years	25	55	19	8	16	154	21
41–50 years	27	52	21	2	8	107	11
51–60 years	32	51	17	3	5	130	8
61–70 years	38	53	8	5	6	91	11
70+years	41	45	13	4	2	72	4
Females							
18–20 years	31	64	5	5	16	52	24
21–25 years	15	78	6	6	13	130	16
26–30 years	30	65	5	3	7	125	10
31–40 years	27	65	9	5	8	208	12
41–50 years	43	46	10	4	5	137	9
51–60 years	50	46	4	1	4	143	8
61–70 years	61	38	1	0	0	102	0
70+years	61	39	0	0	0	103	0
Total Sample	33	54	13	5	10	1772	15
Males	25	54	21	7	15	762	20
Females	40	54	5	3	6	1010	10

A - Abstainers
B - Drinkers: 1 to 60 Drinks per Month
C - Drinkers: More than 60 Drinks per Month
D - Rates of Social Consequences[2]
E - Rates of Loss of Control or Dependence[2]

[1] The percentages are weighted figures and may not total to 100 percent due to rounding; totals shown are the actual number of cases. Slight variations in these totals occur because of nonresponse, etc.

[2] To the left of the Totals column are shown rates of drinking problems based on the total population. To the right of the Totals column are shown rates based on drinkers only. The two problem drinking score,s, (1) the Social Consequences score, and (2) the Loss of Control or Dependence score, are not mutually exclusive. Respondents may have either or both.

drinkers reporting they have some problem associated with their use of alcohol. Among women the marital status groups differ in rates of drinking versus abstention, though there are not the sharp differences in heavier drinking that were noted among male marital status groups. A higher proportion of never-married women also reported social consequences problems due to drinking, and an even higher proportion of this group had a positive score on the loss-of-control or dependence variables.

Blane (1979) and Clark (1977) have commented on such findings as these from past surveys. Young people of both sexes, and males more than females, find license in our society to drink more often than other groups. The rates of drinking problems such as those discussed here would seem to be predictable, as the data indicate. The fact that the rates of these problems will abate as the years pass and amount of drinking lessens does not make the problems less severe; instead it suggests a need to focus research on the factors that lead to a reduction in both amount of drinking and its predictable effects upon the drinkers.

Not shown are data from the 1979 survey relating to respondents' family income and educational level. In these data, as in past surveys, lower income and lower educational status are related to abstention from alcohol. A very weak tendency for heavier drinking to be more common among better educated than less well educated men may be noted. Among women, no such relationship can be seen. Although there are slightly greater rates of both Social Consequences and Dependence and Loss-of-Control scores among lower income groups than among higher, the differences are not great and not consistent. Other surveys, including Cahalan (1970), Cahalan and Room (1974), Knupfer and Room (1964), Mulford (1964), and Bailey et al. (1965), have found income and education to be correlated with alcohol use and some measures of alcohol problems. However, the patterns found in the various studies vary somewhat, perhaps due to differences in the measures of all these variables. The finding common to all is that abstinence is relatively more common among lower educational and income groups.

The survey was also concerned with drinking patterns and problems among several ethnic groups. Here we face a common problem of surveys, that is, having too few cases to do more than examine the overall distributions. However, based on the limited numbers, Hispanic groups of both sexes, but especially males, were found to have relatively high rates of heavier drinking and of problems associated with drinking. Although the number of cases in the 1979 sample is small, earlier surveys have also detected this pattern (Cahalan and Room 1974; Clark 1977).

Also, blacks, and especially black women, were found to have a relatively large proportion of abstainers. However, among blacks who do drink, the proportions of heavier drinkers and drinkers with problems

Table 9. Drinking Patterns and Drinking Problems in the U.S. Adult Population by Marital Status (in Percentages)[1]

	Drinking Categories					Total	Percent Based on Drinkers Only
Marital Status	A	B	C	D	E	*N*	E
Males							
Married	29	54	17	4	10	501	14
Divorced/Separated	26	45	29	14	26	80	35
Widowed	35	54	11	17	19	35	30
Never married	13	57	31	12	25	146	29
Females							
Married	40	55	5	2	5	577	9
Divorced/Separated	26	68	6	3	8	135	10
Widowed	65	32	3	0	0	144	0
Never married	29	63	8	6	15	149	21

A - Abstainers
B - Drinkers: 1 to 60 Drinks per Month
C - Drinkers: More than 60 Drinks per Month
D - Rates of Social Consequences[2,3]
E - Rates of Loss of Control or Dependence[2,3]

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[1] The percentages are weighted figures and may not total to 100 percent due to rounding; totals shown are the actual number of cases. Slight variations in these totals occur because of nonresponse, etc.

[2] To the left of the Totals column are shown rates of drinking problems based on the total population. To the right of the Totals column are shown rates based on drinkers only.

[3] The two problem drinking scores, (1) the Social Consequences score and (2) the Loss of Control or Dependence score, are not mutually exclusive. Respondents may have either or both.

are at least as great as among most other groups. These findings have also been supported by Cahalan and Room (1974).

The other minority groups in the sample are simply too small to comment on. Specially designed sampling techniques will have to be used in future studies to shed light on variations that undoubtedly exist among these groups. Figure 1 shows the areas of the country grouped together in table 10. The substantial differences in drinking patterns are a common finding in past surveys. Cahalan and Room (1974) contains the most thorough exposition of these regional differences, which are related to the traditional "dryness" or "wetness" of each area. There are several explanations for the observed differences: regions differ in their relative proportions of ethnic groups, which in turn differ in their drinking patterns. Religious affiliation is also differentially distributed across the country, with abstinent groups better represented in southern and eastern regions of the country. Differences in the "dryness" of an area are at least potentially an influence on drinkers mainly because the laws and regulations controlling the purchase and use of alcoholic beverages, as well as in the prevailing behavior within an area, may restrict the number of opportunities to use alcoholic beverages.

The data in table 10 illustrate the relative "wetness" of the northern, eastern, southern, and western States. Note that rates of problems due to drinking do *not* parallel the proportions of nondrinkers. In these data, as in other national surveys, the rates of problems among those who do drink are quite high in the southern areas which are commonly associated with dryness (righthand column in table 10). An unexpected finding from these data is the higher percentage of drinkers of both sexes with problems in the mountain regions. This is not supported by Cahalan and Room's (1974) study, which reported the mountain region as being somewhat in the middle range. It is probable that the differences between the survey's findings have to do with variations in sampling *frames* rather than actual changes in drinking problems or alcohol use.

A Final Comment on Drinking and Demographics. Questions about ethnic identification and religious affiliation were also asked in the 1979 survey, and in most past surveys. As was expected, the proportion of abstainers is quite high among the Fundamentalist Protestant groups (57 percent of the females, 36 percent of the males), which exceeds the figures for any other religious group. Catholics, liberal Protestant groups, and those who have no religion contain relatively lower numbers of abstainers and relatively higher proportions of heavy drinkers. However, among the Fundamentalist Protestants who do drink, the proportion of drinkers with problems is quite high—as high or higher, in fact, than that found for traditionally heavy drinking groups (Cahalan and Room 1974). This pattern emerges in the 1979 data but the relationships are not strong and subgroup samples are small.

Table 10. Drinking Patterns and Drinking Problems in the U.S. Adult Population by Region (in Percentages)[1]

		Drinking categories				Total	Percent based on Drinkers only
Region	A	B	C	D	E	*N*	E
Males							
New England	8	66	27	6	10	43	11
Middle Atlantic	22	57	21	6	8	138	10
East North Central	24	54	22	6	14	133	18
West North Central	32	47	21	6	21	64	30
South Atlantic	36	52	12	6	7	128	11
East South Central	49	33	18	7	17	49	40
West South Central	22	55	23	3	26	57	34
Mountain	35	40	25	16	30	41	47
Pacific	10	66	24	10	21	109	23
Females							
New England	25	67	8	0	8	58	11
Middle Atlantic	29	66	5	3	7	174	9
East North Central	35	56	8	2	7	165	11
West North Central	44	53	3	1	4	75	8
South Atlantic	59	40	–[2]	1	2	181	4
East South Central	76	21	3	2	3	75	11
West South Central	47	45	8	5	8	95	16
Mountain	41	46	13	11	18	40	30
Pacific	20	74	6	5	7	147	9

A - Abstainers
B - Drinkers: 1 to 60 Drinks per Month
C - Drinkers: More than 60 Drinks per Month
D - Rates of Social Consequences[2]
E - Rates of Loss of Control or Dependence[2]

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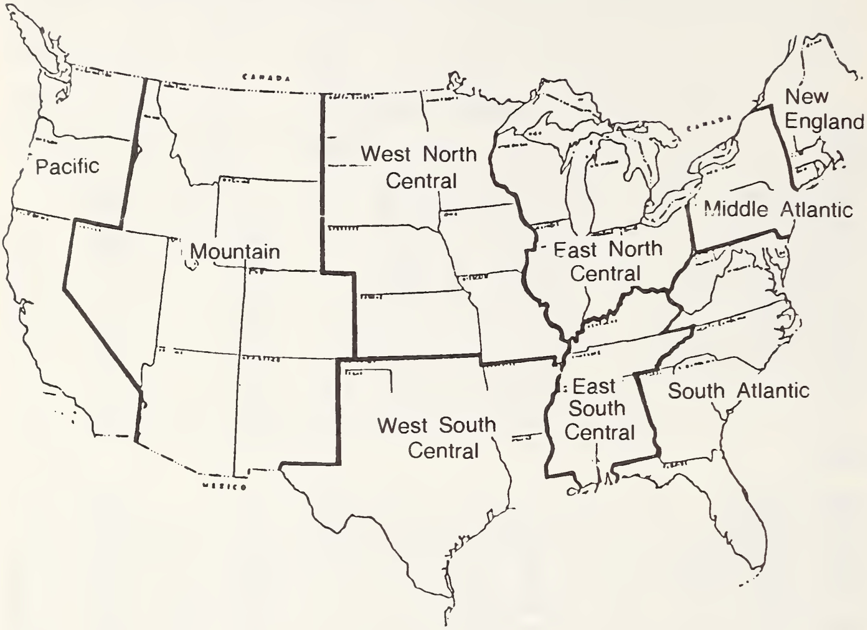
[1] The percentages are weighted figures and may not total to 100 percent due to rounding; totals shown are the actual number of cases. Slight variations in these totals occur because of nonresponse, etc.

[2] Less than 0.5 percent.

[3] To the left of the Totals column are shown rates of drinking problems based on the total population. To the right of the Totals column are shown rates based on drinkers only. The two problem drinking scores, (1) the Social Consequences score and (2) the Loss of Control or Dependence score are not mutually exclusive. Respondents may have either or both.

Figure 1. Regions of the Country



Ethnic background was determined by asking respondents: "What country did most of your ancestors come from?" This crude measure of heritage did produce some expected results. The Irish include a larger than chance proportion of drinkers with problems. (Past work by Cahalan and Room, 1974, suggests that dividing the Irish group into Protestants and Catholics will show the Catholics have the higher problem rate of the two.)

In these data, those who identify with Italy have low rates of abstinence and low rates of drinking problems. Those who identify with Britain and with Germany tend to have rates of both drinking and drinking problems that are intermediate between the aforementioned groups.

It is surprising that crude survey questions on religious affiliation and ethnic identification work as well as they do in explaining variations in patterns of drinking and rates of drinking problems. Clark (1977) cited several large-scale surveys that provide a partial explanation of why the questions work. There is evidence that reports of group identification are measures of who associates with whom in what circumstances. Thus, groups with large proportions of abstainers, for example, contain people who are less likely to interact with heavy drinkers and more apt to associate with others like themselves. As shown by Cahalan et al.

(1969), the differences between Fundamentalist Protestant groups and Catholics in terms of the proportions of drinkers and heavier drinkers are greater still if we also take into account frequency of attending religious services. It was suggested there that frequency of attending services is a measure of commitment to the abstinent ideals of these Protestant groups. Catholics, of course, are not required by their beliefs to abstain, but only to avoid misuse of alcoholic beverage.

In summary, there is reason to believe that what the demographic questions "stand for" are typical patterns of beliefs and networks of association with others who are similar with respect to alcohol use. Ideally, we should pursue the hints we obtain from large-scale surveys in smaller, more focused studies in which we obtain direct measures of the contexts in which drinking takes place and in which problems with drinking emerge.

An Overview of Amount of Drinking and Rates of Alcohol-Related Problems

In this section we will use the same quantity/frequency scale as discussed in the last section; however, here heavier drinkers will be further differentiated by a higher cutting point for the upper category—120 or more drinks per month compared with the 60 or more per month used before. In the relationship between amount of drinking and alcohol problems, note in the totals line of tables 11 through 13 that the cutting point used for the upper amount of drinking is quite high. Only 11 percent ($N = 87$) of men average 120 or more drinks per month; only 1.6 percent ($N = 16$) of women do so. This tiny upper category will illustrate the degree to which drinking large amounts regularly is related to drinking problems. However, such small numbers as these are very apt to be unstable; therefore, the relationship of drinking problems to amount of drinking across all the levels of drinking is a better general guideline. (Details of scale construction for alcohol-related problems used in this section can be obtained from the authors.) The lack of detail here should not pose a problem for present purposes because the scales simply sum respondents' reports of interpersonal and other problems that *they* feel were due to their drinking.

One final note concerns the quite high rates of alcohol-related problems found among women in the upper categories of amount of drinking. A cutting point for that upper category was chosen that would include only the very few women who drink the most (1.6 percent of women compared with 11 percent of men). An equal number of drinks should mean a higher blood alcohol concentration for women compared with men because of differences in body weight, etc. Therefore, it should not be surprising that the rates of several alcohol-related problems are higher for women than for men. For both sexes, amount of drinking is quite regularly associated with higher rates of problems. However, the exact rates of problems shown for women in the highest drinking category are to be interpreted with caution because figures based on so small a number as 16 will be unstable.

Amount of Drinking and Bad Behavior. The three scales in table 11 require little comment. They refer to things respondents would rather not have done, but did in fact do during the past 12 months. Alcohol is widely believed to be a disinhibitor, and whether or not the belief has a pharmacological basis, drinkers commonly report that they "would have behaved differently had they not been drinking." The first scale, belligerence, defines one aspect of this bad behavior: "Drinking caused me to get into a heated argument" or "My drinking sometimes made me bad tempered or hard to get along with." Respondents answering either or both of these items affirmatively are shown in the top line of table 11. Not surprisingly, the percents reporting belligerence due to drinking are larger among heavier than among lighter drinkers.

A second area of "bad behavior" involves child-raising concerns in the past 12 months: "My drinking interfered in some way with the way I raised my children." Although such reports were rare, there is a weak but discernible relationship between amount of drinking and concern about raising children.

Finally, drinking large amounts of alcohol can be an expensive pastime. Note in the bottom line of table 11 that nearly half of the heavy drinkers agree with one or both of these items: "I spent too much money on drinks, or after drinking," "I spent money on drinks that was needed for essentials like food, clothing, or payments."

Amount of Drinking and Interpersonal Problems. Table 12 contains the data on amount of drinking and various interpersonal problems. All measures refer to the 12 months preceding the interview. These problems should not be taken for other than what they appear to be; they are not necessarily indicators of alcoholism or of worsening drinking problems. Rather, they are the respondents' reports of other peoples' objections to their drinking or to their behavior while drinking. As a good deal of research has found, such problems are not highly intercorrelated and in fact they tend to come and go over time (Cahalan 1970; Cahalan and Room 1974; Clark 1976; Polich and Orvis 1979). On the other hand, these events are not trivial; they are real problems in every sense of the word. For instance, the spouse problems scale contains only reports of marriages that were broken or threatened with a break during the past 12 months. In all cases the respondents reported that these problems were due to drinking. Lesser problems between spouses are not reported here, but it should be noted that these are much more common than other interpersonal problems with friends, relatives, etc. Similarly, the problems with friends, relatives, and others contained in that index are reports of broken or nearly broken relationships or reports that friends indicated that the respondent should cut down on drinking. Job problems include reports of losing jobs; being asked by others at work to cut down on drinking; or having

Table 11. Quantity/Frequency of Drinking by Various Measures of 'Bad Behaviors' Related to Drinking (in Percentages)[1]

	Approximate Number of Drinks per Month					
Drinking-related Behavior	Less than 2	Between 2–10	Between 10–60	Between 60–120	Over 120	Total
Males						
Belligerence	3	3	16	15	34	14
Child-raising concerns	0	0	–[2]	2	4	1
Money	0	5	13	22	44	15
(N)	(84)	(103)	(206)	(75)	(87)	(555)
Females						
Belligerence	2	2	11	29	50	8
Child-raising concerns	0	0	0	0	13	–[2]
Money	–[2]	4	16	12	48	9
(N)	(185)	(174)	(188)	(37)	(16)	(600)

[1] The percentages are weighted figures. Totals shown are the actual number of cases. Slight variations in these totals occur because of nonresponse, etc.

[2] Less than 0.5 percent.

lost out on promotions, raises, or better jobs—again, all due to drinking in the past 12 months in the respondents' judgment. The problems with police or accidents due to drinking include being warned or arrested by police for drunkenness, being arrested for drunk driving, or getting in an accident in which someone was injured or substantial property (such as a car) was damaged.

Table 12 contains the data on these drinking problems. First note that these are rare events. Even among those with the highest levels of intake the figures never approach the 50 percent mark. But among those drinkers whose intake is low or fairly low, the rates of problems are extremely small. They increase regularly and strongly as amount of drinking increases, and thus, for both sexes, they pose a substantial risk among those who drink most heavily. The bottom line of table 12 contains the summary of these separate scales which are grouped together as being a problem with drinking that involves someone's objection to the respondents' drinking or poor behavior while drinking.

Amount of Drinking and Alcohol Dependence. As was discussed above, the proper meaning to attach to the data in the scales in this section is not settled. It would not, in our judgment, be correct to infer that a positive answer to items here indicates a clinical case of alcoholism. Nevertheless, such items as these are used for that purpose on various diagnostic questionnaires and are thought by some excellent researchers to be reasonably good indicators of an alcohol dependence syndrome (Armor et al. 1978; Edwards et al. 1977; Polich and Orvis 1979).

In the section above where an overview of alcohol problems in the U.S. population was given, the loss of control scale was combined with the alcohol dependence scale. A positive score on either or both scales was used for this analysis. However, here we will show the two scales separately in their relationships to amount of drinking because, although these two scales are moderately correlated, they differ somewhat in their relationship to amount of drinking—a point that will be considered in more detail under "Alcohol Dependence, Loss of Control, Amount of Drinking, and Drunkenness."

Loss of control over drinking here means reports by respondents that they were afraid they were alcoholics, that they had tried to quit drinking or to cut down but had failed, that they kept on drinking when they had promised themselves not to, or that they had trouble not drinking to the point of complete intoxication once they began drinking. As was

Table 12. Quantity/Frequency of Drinking by Various Social Consequences Due to Drinking (in Percentages)[1]

Social Consequence of Drinking	Approximate Number of Drinks per Month Less than 2	Between 2–10	Between 10–60	Between 60–120	Over 120	Total
Males						
Spouse	0	1	2	0	6	2
Friends, relatives	2	1	7	3	14	6
Police, accidents	0	1	3	6	20	5
Job	0	0	2	–[2]	5	1
Any of the above social consequences	2	2	9	9	27	9
Sample *(N)*	(84)	(103)	(206)	(75)	(87)	(555)
Females						
Spouse	0	0	0	0	0	0
Friends, relatives	–[2]	1	5	11	37	4
Police, accidents	0	1	3	4	17	2
Job	0	0	–[2]	1	4	–[2]
Any of the above social consequences	–[2]	2	6	16	37	5
(N)	(185)	(174)	(188)	(37)	(16)	(600)

[1] The percentages are weighted figures; totals shown are the actual number of cases. Slight variations in these totals occur because of nonresponse, etc.

[2] Less than 0.5 percent.

previously noted, the concept of loss of control is difficult to understand and there is some empirical evidence that casts doubt on its existence in at least some experimental conditions (Paredes et al., 1977, summarize this literature). Nevertheless, there is ample reason to believe that subjective loss of control corresponds to something in many drinkers' experience. It is at least a subjective correlate of alcohol abuse, and it is a strong empirical correlate of such use. Table 13 shows that this measure is strongly and regularly associated with amount of drinking and that it reaches quite high prevalence levels among the heavier drinkers of both sexes in our sample.

The second scale in table 13 is called the dependence scale. Past research has found these items to be strongly related to amount of drinking. That is also the case here where 39 percent of the heaviest drinking men and fully 52 percent of heaviest drinking women reported having experienced two or more of these "symptoms" in the previous 12 months: skipping meals when drinking, sneaking drinks, tremors after drinking, drinking before going to parties "in order to make sure of getting enough," morning drinking to get over a hangover, blackouts, or gulping drinks. It should be kept in mind that, while these things are quite common in clinic populations, they are quite rare in general population samples—9 percent of drinkers in this case. An even smaller number of drinkers would be expected to experience larger numbers of these symptoms, and an even greater relationship to amount of drinking would be expected if one used higher cut-off points on the scale of dependence. The next line in table 13 illustrates just that; only 4 percent of this household sample reported having experienced three or more of these symptoms in the past 12 months. Among heavier drinking men, 24 percent reported this level of dependence symptoms, as measured by these items. Only negligible numbers in lesser drinking categories reported this level of dependence symptoms. Among women, 38 percent of the category of heavy drinkers reported these experiences during the past 12 months. Again, almost none are found in lesser drinking categories, as was the case among male drinkers.

Two points may be suggested here. Those readers who are surprised at the small number of such "dependent drinkers" should remember that this is a household sample; some of the heavy drinkers that are found in clinic populations are not in household samples, but in institutions, transient quarters, and the like. Second, these dependence symptoms are not the only manifestations of drinking problems, nor do they necessarily imply the existence of other kinds of drinking problems. In clinic populations, of course, much higher rates of all types of problems due to drinking are routinely found.

As far as the dependence scale alone is concerned, there is no doubt that these behaviors and experiences represent serious problems. However, they need not necessarily imply future alcohol problems. Our research, and that of others, indicates that the dependence symptoms come and go in general population samples over even as short a span as 4 years, which leads us to suspect that they may be as much alternate indicators of heavy alcohol intake as they are indicators of a process of alcoholism (Clark 1976). It is quite possible that in clinical samples of alcoholics, where problems and indications of alcohol addiction are more tightly clustered than in general population samples, these same items may have different predictive utility. This, too, remains a question for future research. Whatever the outcome of future work, however, the scale does point to people who are drinking heavily and who are experiencing difficulties because of their drinking.

The binge drinking scale (the fourth line in table 13) is a direct report of extreme behavior. These respondents reported that during the past 12 months they "had stayed intoxicated for several days at a time." Even among the heaviest drinkers in our sample, this is a rare event since prolonged intoxication is clearly a threat to almost any lifestyle and perhaps to life itself. None of the lighter drinkers report this behavior.

The fifth line in table 13 contains another straightforward measure of the problems associated with excessive alcohol use. Health worries refers to affirming one or more of the following as having happened in the past 12 months: an illness connected with drinking which kept the respondent from a regular job for a week or so, a feeling that drinking was becoming a serious threat to physical health, or a physician having suggested that the respondent cut down on drinking. Here again we are dealing with a fairly rare event; less than 5 percent of drinkers reported one or more of these. But note in table 13 that the proportion of reports of health worries increases greatly as amount of drinking increases. Fully 14 percent of heavier drinking men and 24 percent of heavier drinking women reported having health worries in the past 12 months. Due to the small number of cases in the heavier drinking category, the exact percents are not stable estimates; however, the association between health worries and heavier drinking is not in doubt.

The lower figures in table 13 are of some interest because they show the percentage of each drinking category reporting any one or more of the above problems *or* any of the social consequences problems shown in table 12. Note that adding together these diverse problems results in strikingly larger rates of problems in the upper categories of amount of drinking as compared with the rates for the problems taken singly. Among drinkers, 23 percent of the men and 12 percent of the women reported one or more of these problems. More important, however, the relationship between having one or more of these problems and amount of drinking is strong and regular. Only negligible percents of light drinkers reported any of these problems; approximately 60 percent of both heavier drinking males and females reported one or more problems. (The product moment correlation between amount of drinking and this combined measure of problem drinking is 0.396 for males and 0.345 for females.) Thus heavier drinking entails very substantial risks of encountering drinking problems of one sort or another.

What do these figures for combined problems mean? One should keep in mind that they are reports of particular problems as defined in the text. Altering the definitions could result in either higher or lower rates of reported problems, depending upon the nature of the change in

Table 13. Quantity/Frequency of Drinking by Various Measures of Alcohol-Related Problems (in Percentages)

	Approximate number of drinks per month					
Alcohol-related Problem	Less than 2	Between 2–10	Between 10–60	Between 60–120	Over 120	Total
Males						
Loss of Control	2	1	14	17	38	14
Dependence						
2+ symptoms	1	3	11	9	39	12
3+ symptoms	0	0	4	4	24	6
Binge drinking	0	0	1	2	3	1
Health worries	1	2	3	9	14	5
Any of the above problems or any social consequences problem	5	7	22	27	62	24
(N)	(84)	(103)	(206)	(75)	(87)	(555)
Females						
Loss of control	3	3	11	20	52	8
Dependence						
2+ symptoms	–[2]	1	8	11	52	5
3+ symptoms	0	0	3	1	38	2
Binge Drinking	0	0	1	0	4	1
Health worries	0	2	6	4	24	3
Any of the above problems or any social consequences problem	2	5	20	34	59	12
(N)	(185)	(174)	(188)	(37)	(16)	(600)

[1] Percentages are weighted figures. Totals shown are the actual number of cases. Slight variations in these totals occur because of nonresponse, etc.

[2] Less than 0.5 percent.

definition. Thus in comparing the rates shown here with those from other studies including the *Third Special Report on Alcohol and Health*, one must keep in mind that differences may be due to the research procedures.

Table 14 illustrates two points concerning drinking problems in this household sample. First, the overall rates of these drinking problems among current drinkers range from 1 percent for binge drinking to 12-14 percent for indications of some degree of loss of control or a modest number of reports of dependence symptoms. The right-hand column in table 14 is perhaps of greater interest. It lists the percent of drinkers with one problem who also report at least one other current problem—any other problem. Thus, for instance, of the 55 males who reported one or more social consequences type of drinking problem, 82 percent also reported at least one other drinking problem in the past 12 months from among those shown in table 14. The figures in the right-hand column are substantially over 50 percent in all cases. Thus it may be fair to say that those with one current drinking problem are also likely to report other current drinking problems. However, this observation should not be pressed too far. As the third column in table 14 shows, some drinkers with one problem did not report that they were having other kinds of problems.

Clinic populations, in contrast to the household population, do report more severe problems and do report higher drinking levels. What we see in general populations, however, is an abundance of alcohol-related problems but relatively few cases that have many such problems simultaneously. However, the search for drinkers who show *all* the ill effects traditionally associated with alcohol abuse should not blind us to the numerous drinkers who have fewer problems due to drinking, but whose problems are nonetheless quite serious.

Alcohol Dependence, Loss of Control, Amount of Drinking, and Drunkenness

In sections above data were presented showing the relationship between amount of drinking and the measures of alcohol dependence and loss of control, with the latter two shown as either present or absent only. Here it will be shown that treating dependence and loss of control as continuous variables is useful, for it shows—as a dichotomy cannot—that the amount of drinking affects the levels of these drinking problems. Higher *scores* on these measures of dependence and loss of control are associated with heavier drinking, just as earlier it was seen that the presence or absence of dependence or loss of control was related to the quantity/frequency of drinking.

Second, it will be shown that reports on frequency of drunkenness can add to our understanding of the occurrence of dependence and loss of control. Even among those who average relatively few drinks per month, drunkenness may contribute to drinking problems; thus, *patterns* of drinking as well as total amount of alcohol drunk affect the emergence of these drinking problems.

Table 14. Percentages of Drinkers with Specific Drinking Problems and Percentages of Those with One Problem Who Have One or More Other Problems of Those Listed[1]

Drinking-Related Problem	Number of Cases with Problem	Percentage of Drinkers with Problem	Percentage of Those with Given Problem Who Have at Least One Other Problem
Males			
Social consequences	55[2]	9	82
Loss of control	86	14	63
Dependence 2+ symptoms	72	12	72
Binge drinking	8	1	100
Health concerns	33	5	62
(*N*)		555	
Females			
Social consequences	25	5	84
Loss of control	42	7	63
Dependence 2+ symptoms	37	5	60
Binge drinking	6	1	100
Health concerns	20	3	75
(*N*)		600	

[1] The percentages are weighted figures. Totals shown are the actual number of cases. Slight variations in these totals occur because of nonresponse, etc.

[2] The table may be read: 55 cases (9 percent of male drinkers) reported one or more social consequences drinking problems in the past 12 months. Of those with that problem, 82 percent also reported having one or more of the other drinking problems listed in the table, etc.

Third, it will be shown how these measures of alcohol consumption and alcohol problems fit together in these survey data. The various measures are not highly intercorrelated, and low levels of dependence and loss of control can be found among lighter drinkers, although with less relative frequency than among heavier drinkers.

In table 15 the alcohol dependence scale is cross-tabulated with the measure of loss of control. Only current drinkers are contained in this table. Note the relatively large percent of cases reporting a single dependence symptom in the past 12 months. In the previous analysis these cases were grouped with those reporting no symptoms, with the assumption that one such instance would have little meaning. Note also that the distributions on both dependence and loss of control are largely made up of zero cases with the percentage of positive responses tailing off rapidly as scores increase. The choice of a cutoff point in such a

Table 15. Alcohol Dependence by Loss of Control (in Percentages)[1]

Alcohol Dependence Score:	None	1	2	3	4+	Percentage Total	Total
Loss of Control Score:							
None	77	8	3	1	—[2]	89	1028
1	2	3	1	1	1	8	80
2	—[2]	—[2]	—[2]	1	—[2]	1	27
3	—[2]	—[2]	—[2]	—[2]	1	1	17
4	0	0	0	0	—[2]	—[2]	3
Percentage Total	79	11	4	3	2		99
(*N*)	924	123	59	26	23		1155

[1] Percentages are weighted figures. Totals shown are the actual number of cases. Slight variations in these occur because of nonresponse, etc.

[2] Less than 0.5 percent.

distribution is obviously arbitrary, and yet the choice of the cutting point makes a very great difference in the apparent rate of these problems. Further difficulties of this nature emerge in the body of the table where we note that 12 percent of drinkers reported only dependence and not loss of control, while a further 2 percent reported the reverse. This leaves only 8 percent of drinkers who have reported having experienced both dependence and loss of control during the 12 months preceding the interview. Thus, in these data at least, the degree of relationship between the two scales does not suggest requiring a positive score on both scales as an indicator of alcohol problems. Therefore, they will be kept separate in the examination of the influence of amount of drinking and drunkenness on the full range of these measures.

Table 16 contains data showing the relationship of amount of drinking and frequency of reported drunkenness to dependence and, separately, to loss of control. The measure of amount of drinking is the five-category "average number of drinks per month" used previously. Both dependence and loss of control are as previously defined, except that the full range of scores is displayed here.

Reported frequency of drunkenness was obtained by asking, "How often in the past year did you drink enough to feel drunk?" Respondents were free to define 'drunk' in any way they chose, but they were also asked how many drinks it would take "before you would feel drunk." The mean response for men was 9.6 drinks (*SD* = 5.5) and for women 5.6 (*SD* = 2.9), which are fairly high quantities. Answer categories for frequency of drunkenness ranged from never (or can't remember) through every day. In table 16 these responses were collapsed into the following three categories:

- Category 1 includes responses of "only once," "never," and "can't remember";
- Category 2 includes responses ranging from "two or three times a month" through "about 8 to 11 times a year";
- Category 3 includes responses ranging from "about once a month" through "every day."

Table 16 clearly shows that as "drinks per month" increases, so does the rate of dependence symptoms, and so does the level of scores on that scale. The correlation between the two measures is 0.405 computed over the full range of both scales. Indeed, no respondents who reported drinking less than an average of 120 drinks per month reported five or more dependence symptoms in the last year; over that level there are cases reporting the higher numbers of symptoms.

In the lower part of that table, amount of drinking is clearly related to the measure of loss of control. Again, it is only in the higher levels of amount of drinking that the highest loss of control scores are found. The correlation of "drinks per month" with loss of control is 0.342. In both cases therefore the degree of relationship between amount of drinking and the alcohol problems is of moderate strength, but in the direction that would be expected.

Frequency of reported drunkenness is also related to both dependence (*r* = 0.476) and to loss of control (*r* = 0.328). The three right-hand columns of table 16 illustrate this clearly. The proportion of drinkers with no dependence or loss of control problems falls off dramatically as frequency of reported drunkenness increases. Similarly, the proportions of drinkers who reported higher scale scores on the two problem measures increases with frequency of drunkenness.

Table 16. Quantity/Frequency of Drinking and Frequency of Drunkenness by Measures of Alcohol Dependence and Loss of Control (in Percentages)[1]

Approximate Number Of Drinks Per Month:	Less than 2			Between 2 & 10			Between 10 & 60			Between 60 & 120			Over 120			All Drinkers			Total
Reported Frequency of Drunkenness[1]	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	
Dependence Symptoms:																			
None:	95	(4)	0	94	71	(3)	87	58	22	87	65	30	72	24	15	91	55	21	80
1	4		0	5	20	(1)	8	25	36	11	26	30	11	32	26	7	25	29	11
2	—[3]		0	1	5	(1)	3	11	34	0	6	37	5	15	25	1	10	29	5
3	0		0	0	4		1	5	0	3	4	0	7	15	9	1	6	5	2
4	0		0	0	0		1	2	8	0	0	3	3	10	7	—[3]	3	5	1
5	0		0	0	0		0	0	0	0	0	0	2	4	8	0	1	5	—[3]
6	0		0	0	0		0	0	0	0	0	0	0	0	2	0	0	1	—[3]
7	0		0	0	0		0	0	0	0	0	0	0	1	5	0	—[3]	3	—[3]
8	0		0	0	0		0	0	0	0	0	0	0	0	4	0	0	2	—[3]
Total	99			100	100		100	101	100	101	101	100	100	101	101	100	100	100	99
Loss of Control Scale:																			
None:	98	(3)	0	99	88	(5)	91	82	63	92	79	50	76	45	61	95	75	61	89
1	2	(1)	0	1	12		7	13	37	4	7	34	15	30	19	4	15	25	7
2	0		0	0	0		1	2	0	4	10	7	7	6	4	1	4	3	2
3	0		0	0	0		1	3	0	0	4	9	2	18	9	—[3]	6	7	2
4	0		0	0	0		0	0	0	0	0	0	0	1	7	0	—[3]	4	—[3]
Total	100			100	100		100	100	100	100	101	100	100	100	100	100	100	100	100
(*N*)	260	4	0	243	28	5	285	87	17	57	37	18	34	31	38	879	187	78	1144

[1] Percentages are weighted figures and may not total to 100 percent due to rounding. Totals shown are the actual number of cases. Slight variations in these occur because of nonresponse, etc. Figures in parentheses are actual unweighted frequencies presented when the number of cases is too few for percents to be given.

[2] Frequency of reported drunkenness codes: 1 = once in past 12 months, never or can't remember; 2 = from twice in last year through "8 to 11 times"; 3 = "about once a month" through "every day."

[3] Less than 0.5 percent.

A further relationship is worth noting: amount of drinking in "drinks per month" is correlated with frequency of drunkenness at 0.489 with both scales expressed in full form. However, even with the three-category form used for frequency of drunkenness here the relationship is clear; none of the "less than two drinks per month" respondents reported that frequency of drunkenness as often as once a month—the lower limit of the third category. In the next higher category of amount of drinking, 5 drinkers, or about 1 percent of that group, reported frequency of drunkenness high enough for inclusion in category 3. Figures for the next three higher amount of drinking groups are 4 percent, 15 percent, and 36 percent, respectively.

However, the conjoint relationship of amount of drinking in "drinks per month" and frequency of drunkenness to the problem scores is at least as striking. Table 16 illustrates that "number of drinks per month" and frequency of drunkenness have to a degree an independent effect on the occurrence of dependence and loss of control. Thus, comparing the three frequency of drunkenness measures within each "drinks per month" category, one finds a greater proportion of dependent drinkers and loss of control drinkers among those who report more frequent drunkenness.

Similarly, if one compares the rates of dependence and loss of control among those who are all in category 3 of frequency of drunkenness but who differ in the "drinks per month" (as in comparing columns 3, 6, 9, 12, and 15, etc.), one finds that higher rates are associated with increased amounts of "drinks per month." This relationship between number of drinks and alcohol problems extends, with only minor exceptions, throughout table 16.

Put in correlational terms, the product moment correlation between number of drinks per month and the dependence scale is 0.405. The partial correlation, controlling for frequency of drunkenness is 0.224. Similarly, number of drinks per month is correlated with loss of control at $r = 0.342$. The partial correlation, controlling for frequency of drunkenness, is 0.221. In both instances the partial correlations, while of moderate strength, indicate that amount of drinking contributes some measure of explanation to dependence and to loss-of-control scales beyond that contributed by the measure of drunkenness. The reverse is also the case; frequency of drunkenness has a small independent relationship to both dependence and loss of control when amount of drinking in "drinks per month" is controlled. Thus the partial correlation of frequency of drunkenness with dependence is 0.349 when controlling for "number of drinks per month" and similarly the partial correlation with loss of control is 0.196, again with "drinks per month" controlled.

However, it is the substantive meaning of these relationships that should be emphasized here. In this household population it is not only the amount of alcoholic drinks per month but also the *pattern* of drinking that makes a difference in rates of drinking problems. Even those who drink relatively few drinks per month but who report instances of drunkenness are found in the problem categories. Thus 29 percent of those who reported drinking only between 2 and 10 drinks per month, but who reported drunkenness between 2 and 11 times last year, also reported at least some level of dependence as measured by this scale, and 12 percent of the same group reported at least some degree of loss of control, again as measured in this survey. This is not an isolated example; throughout table 16 the same general relationship can be found. Intoxication and drinking problems go together in noticeable degree even among those whose total intake of alcoholic beverages is not high. However, total intake as measured by the number of drinks per month also works an effect separately from reported frequency of intoxication. The joint effect of these separate measures of drinking patterns is quite striking. It is only among infrequent drinkers who are even less often drunk that few symptoms of dependence or loss of control can be found. Among those who drink at least 120 drinks per month on the average and who report being drunk at least once a month, both dependence symptoms and loss of control are commonly reported, and the levels of such problems as measured by these scales are also high in comparison with other groups.

Some Final Comments

Research, much of it sponsored by NIAAA, has in recent years produced information on the prevalence and distribution of alcohol problems. Very recently, questions have been raised concerning alcohol problems in certain segments of the population—young adults, women, blacks, Hispanics, and older people. The 1979 survey provides a glimpse of problem rates for these groups, but a national survey cannot contain enough cases to do more than present the barest outlines of the rates of various problems.

As we saw previously, there are relatively fewer female problem drinkers than male problem drinkers. However, when one looks at those who drink most heavily, the proportion of women who reported drinking problems sometimes exceeds the rate for males who drink comparably. This finding is tentative due to the small number of cases, but perhaps future work should focus on this point.

Those aged 18-20 are a group little studied in past surveys. In general, young women in this age group do not seem to differ greatly from women in their twenties with respect to the social consequences drinking problems. They do show somewhat higher rates of loss of control and dependence symptoms compared with women a few years older, however; and this too should be verified with further research. Note that for young men the proportion of abstainers is much lower than for any other age or sex group in the population. The number of cases in the sample who are in this age and sex group are few, and this makes the finding suspect. Again, replication is needed and should be undertaken. The proportion of heavier drinkers within this group is substantially smaller than among older males, which suggests that experimentation with drinking rather than with heavy drinking is characteristic of this youngest group of males.

At the other end of the age distribution we find low rates of drinking and no reported cases of problem drinking among women aged 61 years or older. For males in the same age range, the rates of abstention are substantially higher than for other males. Rates of reported drinking problems are somewhat lower also, and are substantially lower than for males under age 40. Here it is important to remember that we are dealing with a household sample, not with the total population. It could be that older people with alcohol problems are underrepresented in households and overrepresented in hospitals, clinics, and transient quarters. Excessive mortality from drinking will also have reduced their numbers, unfortunately.

Our findings for racial and ethnic groups parallel those found in earlier research but the smaller numbers of cases mean the findings are only tentative. For blacks the rates of abstention are somewhat higher than for most other groups, but for black drinkers the rates of heavy drinking and problem drinking are at least as high as for Caucasian drinkers. The most striking finding, one that should be replicated on larger samples, concerns the extremely high rates of heavy drinking and problem drinking among Hispanic peoples, particularly among males. The great problem here is too few cases for a detailed analysis in a circumstance where detailed analysis is called for. Other groups including Native Americans also deserve closer study, but that is just not possible in this sample.

Now let us turn to a question concerning what we have tried to measure in our research. There is presently no clear-cut distinction between alcoholism and problem drinking that does not contain a measure of arbitrariness. If we select a measure of alcohol dependence, injured health, loss of control, or all three, we still must choose a level that will serve as a dividing line. We can, and we should, look for threshold effects, a point beyond which the risk of damage due to drinking is greatly increased. But even that would not change the fact that many alcohol problems seem to lie on a continuum of seriousness, and perhaps on a continuum of predictive value for future alcohol problems as well.

In one way, there is a risk in focusing attention on alcoholism (however defined) if that detracts attention from the vast majority of alcohol problems that do not involve alcohol addiction or physical damage. The search for a single figure, the number of alcoholics in a given population, can lead us to look at various alcohol problems only as they serve to predict liver or brain damage. Heavy drinking contains substantially increased risk of other problems that can perhaps best be seen as problems in their own right: e.g., accidents, arrests, lost productivity, broken marriages.

The 1979 survey has shown what past work also found. Regular use of alcohol is characteristic of about half of our population, and among drinkers there are fairly well defined subgroups in which heavy drinking is commonplace. It is among these groups, by and large, that the rates of various alcohol problems are highest. Heavy drinking subgroups can most easily be defined in terms of sex, age, ethnicity, and other characteristics, but the largest group of heavy drinkers is found among young people and especially young men. Most of the heavy drinkers in any sizable group avoid serious alcohol problems, but a certain fraction do not escape them. What factors predict this? Here our knowledge is very incomplete, and this suggests some lines for future research.

Heavy drinking among young people is commonplace, and yet by the early-to-mid-thirties, for most people heavy drinking and related problems have lessened. Is there a difference between those who continue heavy drinking and those who do not, or is it the case that the longer one drinks heavily, the greater the risk of alcohol problems of several sorts? Perhaps we should focus attention on the drinkers in their late twenties and early thirties to see what factors predict their cutting down. This will require fairly large samples of people in this age range; some research along these lines is under way.

A second important question has to do with treatment for alcohol problems. The number of people with alcohol problems who ever seek any treatment for their problem related to alcohol is minuscule. The 1979 survey asked, "Have you ever gone to anyone—a physician, AA, a treatment agency, anyone at all—for a problem related in any way to your drinking?" Just over 1 percent of the sample answered affirmatively. What differentiates people who seek help from those who do not? Armor et al. (1978) and Polich et al. (1980) are among those who suggest that severity of problems is one differentiating factor, but there may be others. Again, research on this question would be helpful.

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Chapter 2

Alcohol Use Among Youth

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Abstract

Data from the 1974 and 1978 national studies of adolescent drinking practices conducted by the Research Triangle Institute (RTI) are used to address questions about the extent and nature of adolescent drinking behavior, the demographic, social, and behavioral correlates of use, and the extent and meaning of alcohol misuse by adolescents.

Data from the RTI studies and two other national studies of adolescent drinking since 1974 are consistent with other recently published reports and show a large majority of adolescents with some drinking experience. The 1978 RTI data indicate that about 8 out of 10 high school youths have experimented with alcoholic beverages. Overall, it appears that the proportion of adolescents who use alcoholic beverages has stabilized since 1974, but at a high rate.

In the RTI studies a significant proportion of 10th to 12th graders report drinking weekly (25 percent) or monthly (60 percent). Using a quality-frequency drinking level definition, approximately one in three 10th to 12th graders in both 1974 and 1978 was classified as a moderate/heavier or heavier drinker. About 30 percent of the respondents were classified as abstainers or infrequent drinker categories.

Generally, RTI studies indicate that adolescent drinking increases rapidly between the ages of 13 and 15 and increases less rapidly thereafter. Boys drink more than girls; however, about four out of five 10th to 12th grade girls do drink. There is limited support for the contention that girls' drinking is becoming more like boys' drinking. Black youths drank less than white youths for both RTI study years.

Prevalence and level of alcohol use among adolescents are related to a large number of other variables including peer influence, specifically peer attitudes toward drinking and peer drinking behavior, and parental influence, specifically parents' attitudes and behaviors related to their own and to teenagers' drinking. Behavioral factors such as academic achievement and religious involvement and contextual factors such as drinking location and companions are also related to alcohol use; sociocultural and personality variables are not strongly related to drinking.

A definition of alcohol misuse among youth based on the criteria of frequency of drunkenness and experience of (perceived) alcohol-related negative consequences indicated that approximately 3 out of 10 10th to 12th graders in 1978 were classified in the misuser category. It is clear from

these data that most adolescents drink. And those who drink relatively more apparently engage in high risk behaviors. This information is critical for the policy maker, as it identifies current and potential intervention targets.

Introduction

Questions and concerns regarding adolescent drinking behavior have generated a great deal of attention from researchers, various agency and institutional administrators, and parents during recent years, especially during the 1970s. Numerous studies, concentrating especially on prevalence, have been conducted, the preponderance of them during the last decade. Several researchers have contributed to our understanding through theory-based work. This paper attempts to add to what is currently known about selected aspects of the extent and nature of adolescent drinking behavior. Within this overall purpose, the paper focuses on a rather limited number of questions and issues in order to describe the use of alcohol by adolescents in terms of important demographic, social, and behavioral correlates and to address questions about the extent and meaning of alcohol misuse by adolescents. The 1974 and 1978 national studies of adolescent drinking practices (Rachal et al. 1975, 1980), conducted by the Research Triangle Institute (RTI) under the sponsorship of the National Institute on Alcohol Abuse and Alcoholism (NIAAA), provided extensive data to augment and update other extant information.

Prevalence and Patterns of Alcohol Use Among Adolescents

This section provides information about (a) the proportion of adolescents who drink, (b) changes in recent years in the proportion of adolescents who drink, and (c) how much and how often adolescent drinkers drink.

Summary of Prior Studies

During the last 30 years, hundreds of studies, ranging from local to national efforts, have investigated various aspects of the subjects outlined above. The quality, scope, and methods of these efforts have varied widely. Overall, the studies were characterized as diverse and uneven in quality, with only a small proportion of them being well conceived and well conducted (Blane and Hewitt 1977). The sample sizes ranged from only a score to over 50,000. In almost all cases the population sampled or studied comprised youths in school. Depending on the locality, 20 percent or more of youths 16-18 years old may not be in school on any one day. Those who had dropped out of school or who did not participate because of absenteeism or other reasons may have drinking patterns very different from the youths who attend school. For many studies, then, the sample was not representative of the larger population of youths; thus generalizations cannot legitimately be made beyond the actual participants. All of the studies purporting to measure adolescent drinking were based on respondent self-reports; most of the studies employed self-administered survey instruments. The data obtained may be distorted by deliberate underreporting or overreporting, by errors of recall, or by confusion about what information was being requested. Across the various studies there is little consistency or standardization of drinking behavior measurements or classifications in study reports.

The diversity, inconsistencies, and, in most cases, technical limitations of research aimed at documenting the extent and nature of adolescent drinking have made comparisons and summarizations across studies difficult and uncertain. Nevertheless, a number of investigators have carefully reviewed the literature on alcohol and youth–almost all have paid some attention to the subjects outlined above, which will be discussed in this paper. Since 1975, at least five major reviews of the youth and alcohol literature have been conducted (Barnes 1980; Blane and Hewitt 1977; Mandell and Ginzburg 1977; Marden and Kolodner 1976; Schuckit 1978). The discussion in this section focuses on these reviews.

Scope of the Reviews

The Blane and Hewitt (1977) review is a landmark effort at summarizing 120 surveys reporting prevalence data. The surveys were conducted between 1941 and 1975. In an effort to compare the studies, which ranged widely in their measures of various adolescent drinking dimensions, the authors converted data published in original sources to standardized frequency measures and then reanalyzed them. To date, Blane and Hewitt's effort is the only analytic approach summarizing the adolescent drinking literature.

A central issue addressed by Mandell and Ginzburg (1977) in their notable review of the literature on youths' use of alcohol was the prevalence of the various patterns of alcohol use among youth and recent changes in these patterns. Because an earlier study (Mandell 1962) found that more detailed drinking questions resulted in more accurate reports of actual drinking behavior, Mandell and Ginzburg (1977) concentrated on surveys that asked about consumption of individual beverages (beer, wine, and distilled spirits or whiskey). Although 57 citations were listed in the review, conclusions about prevalence and changes in drinking patterns appear to be based mostly on the authors' summarization of 12 studies that were conducted between 1951 and 1973. Seven of the 12 studies cited were in the 1965-75 decade discussed by Blane and Hewitt (1977).

The review by Marden and Kolodner (1976) was prepared as a report under a contract with NIAAA to examine the "patterns of alcohol use and abuse of American youth." They drew conclusions based on a careful examination of 23 surveys conducted between 1941 and 1974; 11 of the surveys were conducted between 1968 and 1974. The Marden and Kolodner survey paid considerable attention to the 1974 RTI study (Rachal et al. 1975).

Marden and Kolodner cited four factors contributing to the commonly held notion that adolescent drinking is widespread and has been increasing during recent years: (1) because there have been more people in the younger age groups in recent years, their behaviors are more visible; (2) more attention is being paid to problems of youth (including alcohol-related problems); (3) there is better casefinding with regard to substance abuse and other health problems; and (4) there is "clear evidence that young people are using alcoholic beverages with increasing frequencies."

Drinking practices and drinking problems were two of the central concerns of Schuckit's (1978) review. A third issue was alcoholism in youth. The review listed 122 citations. For the most part, the studies ranged over the 20 years prior to the mid-1970s, the most significant studies falling within the last 10 years of that period.

Prepared for the Canadian Department of Health and Welfare, the Barnes (1980) literature review presented a summary in tabular form of prevalence data from 62 studies conducted between 1964 and 1979. The studies include 25 Canadian studies, 35 U.S. studies, and 2 others. Eighty-six references were cited.

General Conclusions From the Reviews

The five literature reviews reflect both areas of agreement and areas of disagreement concerning the epidemiology of adolescent drinking. The Blane and Hewitt (1977) review concluded that there appeared to be no evidence to support the commonly held belief that the prevalence or frequency of adolescent drinking had increased measurably during the period 1965-75. This conclusion is in sharp contrast to the findings of Marden and Kolodner (1976), Mandell and Ginzburg (1977), and Barnes (1980), all of whom concluded that the available literature indicated increased drinking among adolescents during this period. The Schuckit (1978) review concluded that, although the proportion of adolescent drinkers had increased, the rate of increase had slowed. All reviewers agreed that a large proportion of adolescents have had some experience with alcoholic beverages by the time they reach late adolescence. However, it was widely agreed that prevalence data have limited usefulness in describing the parameters of the current or potential problems related to this behavior.

None of the five reviews concluded that adolescent drinking had become heavier or more intense in recent years. Blane and Hewitt (1977) believed that the data did not indicate that drinking frequency had increased. Nor did they think that there were significant differences in the proportions of adolescents drinking to intoxication between 1965-75 and earlier years.

All five reviews concluded that more boys than girls were drinkers during early adolescent years. However, considerable disagreement was apparent among the reviewers on whether the difference in prevalence between girls and boys was narrowing. Regarding the often expressed concern that young people are drinking at an earlier age than before, Blane and Hewitt (1977) concluded that the evidence did not support this contention. The other reviewers did not address this question in detail.

Consistent with almost all available literature, the reviews all found a strong positive correlation between age and drinking status. The increase across years (or grades) appears to peak at grade 11 or age 17 and then plateau.

Alcohol Use Among Adolescents Since 1974

The five reviews summarized in the previous section provide important background information on adolescent drinking. However, there are several sharp differences across the reviews concerning levels and trends of measures defining and describing adolescent drinking. These differences exist despite the fact that the data base for the reviews is virtually the same set of studies covering roughly equivalent periods. Little would be gained in attempting to reconcile these differences. Rather, our approach in this section is to build on the body of information provided by the reviews and their source documents in our examination of prevalence and patterns of adolescent drinking since 1974. We concentrate on the data from three sets of studies of adolescent drinking. Each study provides measures for at least 2 of the years in the timespan 1974-79. Also, for each study series, the same or comparable survey instruments, procedures, and samples were used at multiple points over time. Additionally, the three sets of studies surveyed nationally representative samples, and one of the national samples was a household sample of young people 12-17 years old.

One of the major sets of studies referred to in this discussion is the 1974 and 1978 Research Triangle Institute (RTI) national surveys of adolescent drinking (Rachal et al. 1975, 1980). These studies (referred to as the 1974 RTI study and the 1978 RTI study) were conducted for NIAAA in the springs of 1974 and 1978. The sample for the 1974 RTI study was a two-stage, stratified random sample of classrooms selected to be representative of all 7th- through 12th-grade classrooms in the 48 contiguous States and the District of Columbia. A total of 13,122 adolescents from 643 classrooms in 453 junior and senior high schools participated in the study. Of the total, 5,935 were 10th-12th graders. The 1978 RTI study sample, a three-stage, stratified random sample of 75 schools, was selected to be representative of all 10th-12th graders in the 48 contiguous States and the District of Columbia. A 10th-, an 11th-, and a 12th-grade homeroom or class were selected from each school. A total of 4,918 respondents completed usable questionnaires. The 1974 and 1978 studies used very similar self-administered questionnaires and similar field survey procedures. The response rates, including replacement classrooms, were 72.7 percent in 1974 and 86 percent in 1978.

The series of studies on Drugs and the Nation's High School Students: 1975-79 (Johnston et al. 1979) has been conducted annually each spring since 1975 by the Institute for Social Research (ISR) of the University of Michigan under the sponsorship of the National Institute on Drug Abuse (NIDA). The questionnaires are administered in classrooms. The study focuses on drugs other than alcohol, but a series of questions relating to alcohol usage has been asked each year. Self-administered questionnaires are completed in the classrooms of 125-130 public and private high schools selected to provide an accurate cross section of high school seniors throughout the United States. The number of participants ranged from 15,791 in 1975 to 18,436 in 1977.

The National Drug Abuse Surveys for 1974, 1976, and 1977 (Abelson and Atkinson 1975; Abelson and Fishburne 1976; Abelson et al. 1977) were conducted by the Response Analysis Corporation of Princeton, N.J., and the Social Research Group of George Washington University under the sponsorship of NIDA. The NIDA studies focused on drug use but included a series of questions on alcohol use. For each survey year, the studies were based on personal interviews with nationally representative samples of the adult and youth (aged 12-17) household populations in the contiguous United States. The number of completed interviews for the youth sample was 952 in 1974, 986 in 1976, and 1,272 in 1977. Data from these sets of studies are presented at various points below. The ISR studies and NIDA studies will be used to augment basic results from the 1974 and 1978 RTI studies.

Overall Prevalence

Information on overall prevalence of alcohol use by adolescents is of limited direct clinical, policy, or programmatic usefulness but may serve as a description and an indicator of the possible existence of adolescent problem drinking. The prevalence of adolescent drinking and trends in prevalence rates are of paramount concern. Of primary interest are (a) the proportion of adolescents who have consumed alcohol beverages, and (b) the trend of that proportion during recent years.

Proportion of Adolescent Drinkers

Data from the RTI and ISR studies are consistent with other recently published reports and show a large majority of adolescents with some alcoholic beverage consumption experience (table 1). By age 15 or 16, over three of four youths have used alcoholic beverages during the year prior to the survey. This finding is consistent across the two studies and for each year for which data are available since 1974. In the NIDA studies, however, the results show a markedly lower prevalence of alcohol use among adolescents than found in the other investigations–with only slightly more than one of two adolescents in the age group 12-17 having had any experience with alcoholic beverages. The NIDA studies used a nationally representative household sample and an overall younger population; data were collected through personal interviews. The differences in prevalence rates (even after controlling for age) reported in the NIDA studies and the other studies (which all used school samples and self-administered data collection procedures) obviously warrant further study.

Table 1. Percentages of Adolescents in Three Series of National Surveys with Alcoholic Beverages Consumption Experience

Source	Grade/Age	Prevalence Measure	
RTI studies	Grade	Ever Had a Drink	Had Drink in Past Year
1974	7th–12th	79.7	72.9
1974	10th–12th	88.8	81.1
1978	10th–12th	87.3	80.7
ISR studies	Grade	Ever Used	Used in Past Year
1975	12th	90.4	84.8
1976	12th	91.9	85.7
1977	12th	92.5	87.0
1978	12th	93.1	87.7
1979	12th	93.0	88.1
NIDA studies	Age	Ever Drank	Drank in Past Year
1974	12-17	54.0	51.0
1975	12-17	53.6	49.3
1976	12-17	52.6	47.5

Recent Trends in the Proportion of Adolescent Drinkers

For the comparable 10th- through 12th-grade age group, the prevalence measures for the RTI studies indicate statistically equivalent rates for 1974 and 1978. The ISR and NIDA studies also indicate essentially equivalent rates since 1974-75.

Overall, it appears that the proportion of adolescents who use alcoholic beverages has stabilized since 1974, but at a high rate. There is little or no evidence that the proportion of adolescents who use alcohol has increased since the mid-1970s. This conclusion does not seem surprising given the very high proportion of users shown in the RTI and ISR studies. In other words, given that a certain proportion of adolescents do not drink for religious or other reasons, there is a ceiling effect on drinking prevalence. Though the NIDA studies have reported lower prevalence rates than the ISR and RTI studies, their rates too have been stable over time.

Frequency and Quantity of Adolescent Drinking

Information on how often and how much adolescents drink helps to describe this behavior more meaningfully than is possible with prevalence data alone. It was noted previously that few studies provide useful information on the quantity and frequency (Q-F) of alcohol use by youth. Fortunately, the study series focused on here used consistent Q-F measures for each year the studies were conducted. Important elements of these data from the three sets of studies are used below to help assess the Q-F of adolescent drinking and indications of recent changes.

Recent data on the frequency of adolescent drinking are shown in table 2. It is apparent from the RTI data that a significant proportion of adolescents drink fairly frequently. In both 1974 and 1978, well over 1 of 4 10th-12th graders drank at least once a week, and over 6 of 10 drank at least once a month. In 1974, for the entire grade range 7-12, over 23 percent drank at least once a week. In 1978, over 8 percent of 10th-12th graders reported drinking 3 or 4 times a week. Though the ISR sample and measures cannot be compared directly with the RTI studies, the results appear to be consistent. About 7 of 10 U.S. high school seniors reported drinking at least once during the 30 days prior to the 1975, 1977, and 1979 surveys. In 1979, almost 18 percent of the seniors reported drinking on at least 10 occasions during the 30-day reference period.

The NIDA studies (as would be expected based on the prevalence rates discussed earlier) reported lower alcohol usage during the month prior to the survey than that implied by the RTI and ISR findings. Overall, the frequency of adolescent drinking appears to have been stable during recent years.

Frequency measures are useful for classifying adolescent drinkers. However, frequency data alone can be misleading in that they overstate the drinking of the significant portion of the adolescent population who drink often but in small amounts. For the 1974 and 1978 RTI studies, a drinking level (DL) classification scheme, using both quantity and frequency information and consisting of six levels of alcohol use, was developed and used to classify the respondents (table 3).

The DL is an adaptation from the Q-F classifications developed by Mulford and Miller (1960) and used by Maddox and Williams (1968).

Table 2. Percentage of Adolescent Drinkers in Three Series of National Surveys by Frequency of Drinking

Frequency Measure	Year: Grade (Age)		
RTI Studies			
Drinking frequency	1974:7th–12th	1974:10th–12th	1978:10th–12th
Every day	2.4	2.7	1.8
3–4 days per week	5.9	7.6	6.7
1–2 days per week	15.0	18.7	18.9
(once a week or more often)[1]	(23.3)	(29.0)	(27.4)
3–4 days per month	16.6	20.6	19.0
About once per month	14.9	15.0	15.6
(once a month or more often)[1]	(54.8)	(64.6)	(62.0)
Less than once a month	27.6	22.7	24.6
ISR Studies			
No. of occasions used in last 30 days	1975:12th	1977:12th	1979:12th
40+	2.2	2.6	2.8
20–39	3.5	3.5	4.1
(Daily:20+, ISR definition)[1]	(5.7)	(6.1)	(6.9)
10–19	10.1	11.2	10.8
3–9	30.2	32.7	32.5
1–2	22.1	22.2	21.6
(once)[1]	(68.1)	(72.2)	(71.8)
NIDA Studies			
Days used in past month	1974:(12-17)	1975:(12-17)	1977:(12-17)
Every day	<0.5	<0.5	0.5
21+	<0.5	<0.5	1.1
11–20	2.0	0.8	1.8
5–10	5.0	4.7	3.2
1–4	27.0	26.6	24.6
(1 or more)[1]	(34.0)	(32.4)	(31.2)

[1] Cumulative measures.

Perhaps the most striking aspect of table 3 is the remarkable consistency between results of the 1974 and 1978 RTI studies for their respective 10th-12th graders. Except for small differences in the abstainer and infrequent drinker categories, the classifications are virtually equivalent. Using the DL definition, we find that approximately one of three 10th-12th graders in both 1974 and 1978 was classified as a moderate/heavier to heavier drinker. However, over 30 percent of the respondents fell into either the abstainer or the infrequent drinker category. Except for small differences noted in table 3 between the

Estimates of the ounces of ethanol consumed per day by respondents in the various DL groups are shown in table 4. These estimates are highly consistent with the other information presented in table 3 and show few differences across the 2 study years for the 10th-12th graders.

Table 3. 1974 and 1978 RTI Studies: Percentages of Respondents in Each Drinking Level Group[1]

Drinking Level Group Description	1974 Study: Grades 7–12	1974 Study: Grades 10–12	1978 Study:: Grades 10–12
Abstainers—don't drink or drink less often than once a year.[2]	27.3	19.4	25.0
Infrequent drinkers—drink once a month at most and drink small amounts per typical drinking occasion.[3]	16.3	11.2	7.6
Light drinkers—drink once a month at most and drink medium amounts per typical drinking occasion or drink no more than three to four times a month and drink small amounts per typical drinking occasion.	16.6	18.5	18.8
Moderate drinkers—drink at least once a week and small amounts per typical drinking occasion or three to four times a month and medium amounts per typical drinking occasion or no more than once a month and large amounts per typical drinking occasion.	15.5	17.3	16.6
Moderate/heavier drinkers—drink at least once a week and medium amounts per typical drinking occasion or three to four times a month and large amounts per typical drinking occasion.	13.7	18.7	17.3
Heavier drinkers—drink at least once a week and large amounts per typical drinking occasion.	10.6	14.9	14.8
(*N*)	(13,122)	(5,935)	(4,918)

[1] Percentages are based on "weighted" observations.

[2] Those who drank less than once a year were classified as abstainers because the absolute alcohol consumed per day was essentially "0." Of those classified as abstainers above, 4.5 percent in 1974 and 4.0 percent in 1978 were "former drinkers"; i.e., they had had at least two to three drinks at some time in the past but not in the preceding year.

[3] Small, medium, and large amounts refer to one drink (or beer) or less per drinking occasion, two to four drinks (or beer) per drinking occasion, and five or more drinks (or beer) per drinking occasion, respectively.

Table 4. 1974 and 1978 RTI Studies: Distribution of 10th–12th Grade Study Participants by Drinking Level Group and Ounces of Ethanol Consumed per Day

Drinking Level	Ounces per Day 1974	 1978
Abstainer	0.00	0.00
Infrequent	0.02	0.02
Light	0.07	0.06
Moderate	0.23	0.21
Moderate/heavier	0.72	0.67
Heavier	2.32	1.85
(*N*)	5,935	4,918

Data on the recent frequency of high consumption from the ISR studies are shown in table 5. Two points are apparent from the table. First, a significant proportion of the high school seniors surveyed are "heavier" drinkers. About one of six high school seniors had drunk five or more drinks on at least three occasions (about each fifth day on the average) in the 2 weeks prior to the survey. The second point again addresses the question of recent changes in drinking levels. Consistent with the RTI data, the ISR data appear to indicate nearly equivalent levels of drinking over the study years.

Table 5. ISR Studies: Percentages of High School Seniors Reporting Consumption of Five or More Drinks in a Row in the 2 Weeks Prior to Survey

Number Times Respondent Had 5+Drinks in Last 2 Weeks	1975	1976	1977	1978
None	63.2	62.9	60.6	58.9
Three or more times	15.8	15.7	17.9	17.5

Selected Correlates of Adolescent Alcohol Use: Findings From Descriptive Research

A wide variety of factors have been investigated for their influence on drinking among teenagers. Blane and Hewitt (1977) and others (e.g., Barnes 1980; Mandell and Ginzburg 1977; Marden and Kolodner 1976) have reviewed the pertinent literature published through the mid-1970s. This section summarizes major findings from these reviews, supplemented by findings from more recent studies. Descriptive data from the 1974 and 1978 RTI studies of drinking among high school students will be presented here.

In general, research on adolescent drinking has been characterized by little theoretical integration and virtually no systematic accumulation of knowledge, owing, in part, to the recency of the emerging focus on teenagers. While the work of Jessor and Jessor and their colleagues and that of Zucker are considered exceptions, most of the studies of teenaged drinking have contributed only descriptively to our knowledge, without systematically adding to our ability to explain adolescent drinking behavior. Describing a phenomenon whose extent was unknown less than 10 years ago is certainly worthwhile; and empirically demonstrating the association of a number of variables with the phenomenon of teenaged drinking certainly suggests useful explanatory approaches. Nevertheless, it must be kept in mind that the state of knowledge of adolescent drinking has only recently begun to progress beyond a simple enumeration of the variables that have been found to correlate with drinking by teenagers. Because little work has been done using complex multivariate approaches, an association between any single variable and teenaged drinking must be regarded as tentative. For example, the widely demonstrated correlation between peer influence and adolescent drinking is not well understood. When considered alone, peer influence is strongly associated with adolescent drinking; however, the findings are based on univariate approaches. Study design weaknesses, differences in operational definitions, and inadequate controls for other variables have hindered systematic and cumulative investigation of influence on drinking.

Demographic Correlates

Past studies of adolescent drinking have consistently shown strong associations between various demographic correlates and adolescent drinking (Barnes 1980; Blane and Hewitt 1977; Mandell and Ginzburg 1977; Marden and Kolodner 1976; Schuckit 1978). This section examines recent data describing the relationship between adolescent drinking and age or school grade, sex, and ethnic group or race.

Age/Grade

Almost without exception, studies of adolescent drinking have reported that older adolescents are more likely to drink. The general relationship is also shown in the data from the 1974 and 1978 RTI studies (tables 6-8). The RTI studies provide detailed data on changes in drinking patterns with age; however, data for the lower end of the adolescent age range (12-14) are available for 1974 only. Data for 13-year-olds are shown in table 6. As shown in table 6 and in the summary data in table 7, drinking levels appear to increase rapidly with age at the lower level of the age range. Although 17- and 18-year-olds drink more than 15-year-olds, a substantial number of 15-year-olds drink large amounts. The data for 1974 show about equal proportions of abstainers and infrequent drinkers for 17- and 18-year-olds and an increase of 6.7 percent in moderate/heavier or heavier drinking for 18-year-olds in contrast to 17-year-olds. The 1978 results for 17- and 18-year-olds are similar. Generally, the RTI studies indicate that adolescent drinking increases rapidly between the ages of 13 and 15, increasing less rapidly thereafter. The drinking patterns of 17-year-olds are not much different from the patterns of 18-year-olds.

Table 6. 1974 and 1978 RTI Studies: Percentage at Each Drinking Level by Age

	1974 Study					1978 Study			
Drinking Level	13	15	16	17	18	15	16	17	18
Abstainer	37.8	19.7	21.2	16.9	20.3	30.4	27.0	22.0	20.5
Infrequent	23.6	13.1	11.7	11.4	7.0	8.2	8.2	7.1	6.7
Light	14.4	19.8	17.4	20.3	15.4	19.3	17.9	20.3	17.0
Moderate	12.7	17.9	17.3	17.3	16.5	16.0	18.2	14.2	18.9
Moderate/heavier	7.3	17.3	17.9	19.3	21.1	16.4	15.0	18.7	20.1
Heavier	4.3	12.3	14.6	14.8	19.7	9.8	13.7	17.8	16.8
(*N*)	3,468	1,031	1,990	1,969	945	924	1,632	1,595	767

Table 7. 1974 and 1978 RTI Studies: Percentages in Selected Drinking Level Categories by Selected Ages

	1974 Study				1978 Study		
Drinking Level	13	15	17	18	15	17	18
Abstainer or infrequent	61.4	32.8	28.3	27.3	38.6	29.1	27.2
Moderate/heavier or heavier	11.6	29.6	34.1	40.8	26.2	36.5	36.9

Table 8. 1974 and 1978 RTI Studies: Percentage of 10th–12th Graders at Each Drinking Level by Sex

	1974 Study		1978 Study	
Drinking Level	M	F	M	F
Abstainer	15.5	23.3	22.7	27.3
Infrequent	8.1	14.2	6.2	9.1
Light	16.0	20.9	15.7	22.0
Moderate	17.0	17.5	15.8	17.4
Moderate/heavier	21.7	15.7	18.8	15.7
Heavier	21.7	8.4	20.9	8.9
(*N*)	(2,820)	(3,115)	(2,276)	(2,642)

Sex

Historically, adolescent boys have been reported to drink more than girls. Data from the 1974 and 1978 RTI studies support this assertion (table 8). For both years, the percentage of girls abstaining is larger, and the percentage of boys classified as drinking heavier amounts is larger. Reports often contend that girls drink less often and in smaller amounts at each drinking episode than boys. Some support for this contention is offered by the RTI data on girl drinkers for both 1974 and 1978; approximately 2 of 3 girls were classified as drinking moderately or less. In contrast, about 1 of 2 boy drinkers was classified as drinking moderately or less. Also, whereas approximately 1 of 5 10th- through 12th-grade boys was classified as a heavier drinker, only 1 of 11 girls the same age fell into that drinking category.

Table 9. ISR Studies: Percentages of 12th Graders Who Used Alcohol in Last 12 Months and 30 Days Before the Survey by Sex

	Used in Year Before		Used 30 Days Before	
Study Year	Male	Female	Male	Female
1975	88.1	82.1	75.0	62.2
1976	88.3	83.2	74.5	61.8
1977	90.0	84.3	77.8	65.0
1978	90.0	85.7	77.5	67.1
1979	89.7	86.5	76.7	67.0

This discussion should not be construed as indicating that drinking among girls is uncommon. For both RTI studies, more than 7 of 10 10th- and 12th-grade girls are drinkers. The ISR studies' annual prevalence data indicate that over 80 percent of 12th-grade girls had one or more drinks in the 12 months prior to the survey, and over 60 percent had used alcohol in the 30 days prior to the survey (table 9).

A fairly recent concern regarding adolescent drinking is whether girls' drinking patterns are becoming similar to boys'. Some evidence from the RTI and ISR studies indicates that this may be the case. The RTI data, summarized to classify all adolescents as "moderate drinkers or less" or "moderate/heavier drinkers or more," show that differences between boys and girls in the categories decreased between 1974 and 1978. In 1974, about 18 percent more girls than boys were classified as drinking at a "moderate" level or less. By 1978, this difference had fallen to about 13 percent. On the other hand, in 1974, about 19 percent more boys than girls were classified as moderate/heavier and heavier drinkers. By 1978, the difference had fallen to 14 percent. The ISR data indicate that, for high school seniors, sex differences in both annual and 30-day prevalence rates have decreased somewhat since 1975. The annual prevalence difference fell from 6.0 percent in 1975 to 3.2 percent in 1979; the 30-day prevalence difference fell from 12.8 percent in 1975 to 9.7 percent in 1979.

Ethnic Group/Race

The usual contention that black youths drink less than white youths is supported by the RTI studies. For the 1978 study, black youth had markedly higher abstainer rates and lower heavier drinker rates than whites (table 10). The percentage of blacks classified as heavier drinkers was only about one-third that of whites. Except for the heavier drinker categories, Spanish Americans exhibited drinking patterns similar to whites. The 1978 RTI study results were consistent with results for the 1974 RTI study, which included 7th-12th graders. The NIDA studies have also consistently reported higher drinking rates for whites than nonwhites (for the month before the survey).

Selected classes of variables that have been investigated as correlates of alcohol use by teenagers (generally between the ages of 12 and 18 and almost exclusively high school students) are summarized below. Following Blane and Hewitt (1977), we will classify and discuss the variables in categories that begin with the sociocultural level and move increasingly closer to the individual level. (The following discussion of previous findings regarding correlates of adolescent alcohol use

Table 10. 1978 RTI Study: Percentages of 10th–12th Graders at Each Drinking Level by Ethnic Self-Classification

Drinking Level	Ethnic Self-Classification		
	Black	Spanish American	White Other[1]
Abstainer	36.1	21.1	21.1
Infrequent	12.1	20.5	7.4
Light	28.1	21.6	23.8
Moderate	11.3	17.5	18.0
Moderate/heavier	8.5	15.1	17.6
Heavier	3.9	4.2	12.2
(*N*)	(496)	(264)	(4,158)

[1] Includes those classifying themselves as American Indians (1 percent), Orientals (1 percent), or other (3.5 percent).

is basically a summary of Blane and Hewitt (1977). We have independently reviewed many of the studies Blane and Hewitt discussed and generally concur with their findings. Studies published since 1976 that we have reviewed have revealed little new information regarding univariate correlations and serve mainly to reinforce Blane and Hewitt's conclusions. The reader is referred to the review by Blane and Hewitt for citations of the particular studies published prior to 1976.)

Sociocultural Correlates

Included within this category of variables are size of community, socioeconomic status, and religious affiliation. In general, adolescent alcohol use has been found to be more prevalent in urban than in rural communities and in larger than in smaller communities. There are exceptions, e.g., rural American Indians and suburban teenagers; the differences, which were never very large, may be decreasing. Regional differences in rates of abstention are most evident between the Northeast and South, with the Northeast having much higher drinking rates.

Findings about the correlation between socioeconomic status and teenaged drinking are mixed, with little more than a weak relationship demonstrated in any study, and with only slightly more studies showing the relationship to be positive than studies showing a negative or neutral relationship. Crudeness of the measures and questionable ability of teenagers to report accurately parents' socioeconomic attributes may certainly contribute to these findings, but the consistently weak association across most studies and over time may also mean that socioeconomic status makes little difference.

Religious affiliation, on the other hand, has been found to be consistently and repeatedly related to adolescent alcohol use. Most studies show that use is least prevalent among teenagers affiliated with fundamentalist denominations such as the Mormons and Baptists and most prevalent among liberal Protestants (i.e., Presbyterians, Episcopalians), Catholics, and Jews. Usually, the proportion of adolescents reporting heaviest use is highest for Catholics and lowest for Jews.

Results from the two RTI studies were compared on three sociocultural variables: an index of socioeconomic status, religious affiliation, and an index of religiosity (the degree to which religious beliefs and activities are important). The 1978 data for these measures are shown in tables 11, 12, and 13. Consistent with the literature, drinking among teenagers does not seem to be related to socioeconomic status. On the other hand, drinking does vary among teenagers affiliated with different religions. More Baptists, Other Protestants, and Other Religions abstain than do Catholics or Jews. Catholic teenagers drink slightly more heavily than do teenagers of other faiths. The patterns of drinking among teenagers of the same religious affiliation persisted over the 4 years, with the exception of Jews, many more of whom reported abstention and fewer of whom reported heavier drinking in 1978. Religiosity is inversely related to drinking level for both years, with little significant change between 1974 and 1978.

Family Correlates

Family structure, parents' attitudes and behavior unrelated to alcohol use, parents' attitudes related to drinking, and parents' drinking behaviors are the generic variables included in this category. Family structure has been measured most often in terms of presence or absence of one or both parents, with a few studies investigating family size and birth order. Parents' attitudes and behaviors not related to alcohol use have been reflected in reports (mostly by teenagers) on the quality of the parent-child relationship and on child-rearing practices along dimensions such as closeness, rates of interaction, parental responsiveness, degree of family control and discipline, compatibility of attitudes, and orientation to parental authority. Parents' attitudes related to drinking by teenagers have been operationalized in terms of parents'

Table 11. 1978 RTI Study: Mean Socioeconomic Status Score for Each Drinking Level for 10th–12th Graders

Drinking Level	Socioeconomic Status[1]
Abstainer	6.52
Infrequent	6.72
Light	6.59
Moderate	6.76
Moderate/heavier	6.77
Heavier	6.61
(N)	4,918

[1] Lowest Socioeconomic Status (SES) = 0, highest SES = 9, the score for each DL group is the mean SES for that group.

Table 12. 1978 RTI Study: Percentages of 10th–12th Graders at Each Drinking Level by Religious Affiliation

Drinking Level	Catholics	Baptists	Other Protestants	Jews	Other Religions	Total
Abstainer	16.3	30.6	31.1	18.9	32.0	25.5
Infrequent	8.7	6.6	7.4	11.4	10.5	7.8
Light	19.1	19.1	17.9	28.6	19.4	18.9
Moderate	19.1	13.1	15.4	26.0	16.5	16.4
Moderate/heavier	19.8	16.9	14.2	8.8	11.9	16.7
Heavier	17.0	13.8	14.0	6.3	9.7	14.8
Total	100.0	100.0	100.0	100.0	100.0	100.0
(N)	1,659	886	1,410	101	57	4,113

knowledge of, permission for, and approval of the respondent's alcohol use. Keeping alcohol in the home and adolescents' perceptions of quantity and frequency of parents' use were the measures usually examined as indicators of parents' drinking behaviors.

Table 13. 1978 RTI Study: Mean Measure of Religiosity for Each Drinking Level for 10th–12th Graders

Drinking Level	Religiosity[1]
Abstainer	14.99
Infrequent	13.91
Light	13.31
Moderate	12.26
Moderate/heavier	11.89
Heavier	10.97
(N)	4,595

[1] Lowest religiosity = 5, highest = 20, based on sum of responses to five items measuring importance of religious beliefs and activities; the score for each Drinking Level group is the mean religiosity for that group.

Family structure variables seem to be only weakly, if at all, related to teenaged drinking, though drinking is somewhat more prevalent among adolescents from parent-absent homes. General (not alcohol-specific) parent-child relationships and child-rearing practices were found to be related to alcohol use, at least with respect to the significant association that has been demonstrated between negative perceptions of family relationships, negative parental characteristics, rejection of parental authority, and prevalence of drinking and of heavier drinking. Among the family correlates, the strongest relationships were found between alcohol use and parents' attitudes related to drinking by adolescents, although the relationship is apparently not linear. Generally, use seems to increase with parental approval, permission, and even encouragement; but there is evidence that some of the heaviest drinking occurs among adolescents who perceive their parents as strongly disapproving of or forbidding teenaged drinking. Studies examining presence of alcohol in the home all found more adolescent alcohol users in homes where alcohol is present. Parents' drinking behavior is apparently related to adolescent use in complex ways, although parents' and teenagers' drinking behaviors have been consistently shown to be similar. There is wide variety in the strength of this association. Furthermore, this association is strongest between teenagers and parents of the same sex and for girls generally.

Tables 14 and 15 report information from the 1978 RTI study on the relationship between teenaged drinking and teenagers' perceptions of parents' alcohol use and parents' attitudes about teenaged drinking. The data indicate that teenagers' drinking is related to their perceptions of their parents' alcohol use, with abstainers being more likely to report abstention by their parents. However, heavier drinkers are not nearly as likely to report consistency between their own and their parents' drinking. Interestingly, the relationship appeared to be slightly stronger in 1978 than in 1974. There is also consistency between teenagers' drinking and their parents' approval or disapproval of drinking. Fewer abstainers reported parental approval and more reported parental disapproval, while the situation was almost exactly reversed for heavier drinkers.

Table 14. 1978 RTI Study: Percentages of 10th–12th Graders at Each Drinking Level by Perceptions of Parents' Alcohol Use

	Perception of Parents' Alcohol Use			
Drinking Level	One or Both Parents Drink Regularly	One or Both Parents Drink Sometimes	Neither Parent Drinks	Total
Abstainer	15.6	21.9	53.2	24.9
Infrequent	6.7	9.5	3.6	7.6
Light	19.2	19.5	13.8	18.5
Moderate	18.4	17.6	10.0	16.7
Moderate/heavier	21.5	16.6	11.4	17.4
Heavier	18.6	14.9	8.0	15.1
Total	100.0	100.0	100.0	100.0
(N)	1,668	2,357	704	4,729

Contextual Correlates

Where drinking occurs, with whom alcohol is consumed, and how the alcohol is obtained are the kinds of variables subsumed under drinking context. Most studies examine the contextual characteristics of current drinking behavior and seek to describe the usual or typical drinking context. Sources of alcohol are predominantly parents or peers, with teenagers' purchasing it themselves or having someone else (a friend or an older youth) buy it (less frequent sources).

Places or settings where drinking occurs have been categorized as in the home, at parties or friends' homes, in public establishments like bars or restaurants, driving around or parked in a car, at school functions, in teenager hangouts, at "secluded" spots, and in outdoor locations. Not all studies ask about all settings, and studies differ in whether they examine the most frequent setting, all the settings where a respondent has ever used alcohol, or several settings and their frequency of use. Thus, results are difficult to compare across studies. Nevertheless, some general statements seem to be supported. First, the drinker's own home has consistently been reported as the most frequent drinking location; however, settings outside the home are named by more adolescents overall. The number of settings reported increases with alcohol use, and heavier drinking seems to be related to drinking in settings outside the home.

Table 15. 1978 RTI Study: Percentages of 10th–12th Graders at Each Drinking Level by Parents' Attitudes About Teenage Drinking

	Parents' Attitudes About Teenagers' Drinking			
	Males		Females	
Drinking Level	Approve	Disapprove	Approve	Disapprove
Abstainer	9.8	30.1	10.8	28.5
Infrequent	5.7	7.7	4.8	7.5
Light	12.4	19.5	14.5	18.8
Moderate	20.3	15.5	22.2	15.7
Moderate/heavier	24.9	15.1	24.2	16.4
Heavier	26.9	12.1	23.4	13.0
Total	100.0	100.0	100.0	100.0
(N)	224	2,018	124	1,946

Drinking companions are most often friends or peers, although parents or other relatives are named second most often, followed by mixed peer and adult company, older friends, and alone. Teenagers who drink more tend to drink with peers, not with adults. Although few teenagers drink alone, those who do drink heavily.

Selected "context of drinking" information from the 1978 RTI study is reported in table 16. Examination of the bottom row in table 16 reveals that outside the home with peers is the favorite setting-company drinking context among teenagers, both in terms of numbers of adolescents who ever drink in this context and in terms of those who drink in this context most of the time. Within any single context, drinking levels vary with frequency of drinking in the context, although, interestingly, the relationship seems weakest for drinking alone, a context in which even most (essential) abstainers have at some time consumed alcohol. Examination of the 1974 data revealed little change between 1974 and 1978 in the proportions drinking in any of the contexts or in the distributions of extent of alcohol use within the contexts.

Peer Influence

The association between peers and alcohol use among adolescents has been investigated beyond the description of drinking company. In most studies, measures of peer influence have included such variables as perceptions of peer pressure to drink, perceptions of peer behavior and attitudes related to drinking, and peer group drinking behavior.

Table 16. 1978 RTI Study: Percentages of 10th–12th Graders at Each Drinking Level by Drinking Setting and Company

	Alone		At Home with Parents		Outside the Home With Peers - No Adults Present	
Drinking Level	Never	Most of the Time	Never	Most of the Time	Never	Most of the Time
Abstainer[1]	34.6	0.3	51.9	5.0	75.7	1.8
Infrequent	9.0	4.1	4.3	8.3	11.5	1.3
Light	19.8	8.8	13.6	18.8	9.1	12.2
Moderate	15.0	12.9	12.1	19.3	2.4	20.7
Moderate/heavier	12.7	31.4	10.3	26.6	1.1	31.8
Heavier	9.0	42.5	7.8	21.9	0.1	32.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
(N)	3,349	126	1,392	1,024	1,206	1,915
% of Sample	68.3	2.7	31.8	19.7	25.2	38.7

[1] Abstainers may have drunk alcohol in previous years.

Perceptions of peer pressure have been measured through questions about directly experiencing such pressure or about reasons for drinking (e.g., "to win approval and be accepted by friends"). Reports about peers' attitudes and behaviors related to drinking have been obtained by asking the respondent if friends approve of his or her drinking, how many friends drink, and to what extent. In a few cases, peer group drinking has been more extensively studied by characterizing the drinking ethos (meanings and behaviors) of closely knit groups of adolescents.

Peer pressure has been found to be only weakly related to the level of alcohol use, though there is indirect evidence that drinking onset may be influenced by peers. It has been found, for example, that abstainers report less pressure to drink and that drinkers, especially heavier drinkers, report more pressure. On the other hand, conformity, acceptance, approval, and avoidance of ridicule have not been found to be primary reasons for drinking among most adolescents, although overt endorsement of drinking is prevalent among heavy drinkers. Perhaps the strongest and most consistent univariate relationship between alcohol use and any correlate is the one between alcohol use and peers' attitudes and behavior related to drinking. Prevalence, frequency, and level of drinking all vary directly with the number of friends who drink, the extent of friends' drinking, and the degree of consensus among friends approving drinking. A few studies, which described closely knit peer groups, found that alcohol and alcohol use have specific meanings within such groups, that the groups exhibit different levels and styles of drinking related to those meanings, and that member status in such groups is related to the degree to which personal alcohol use corresponds to group norms.

The results of the RTI studies were generally consistent with the extant literature on peer influences. Peers' drinking-related behavior and attitudes are fairly strongly related to drinking levels among adolescents. Few abstainers associate exclusively with peers, most or all of whom drink, and a disproportionately large number of abstainers "hang around" with other abstainers (table 17). On the other hand, while most heavier drinkers associate with other drinkers, they do not restrict their associations to the extent that abstainers do. Overall, across the 4 years there was little difference in the relationship between drinking and number of peers who drink. Approval of teenaged drinking is the modal attitude among peers, followed closely by neutrality, with a disapproving position perceived only by a small minority of adolescents (table 18). The higher the drinking level, the more likely that peers are perceived as approving; the lower the drinking level, the more likely that peers are perceived as disapproving. These relationships are fairly constant except for abstainers, who perceive a disproportionately high level of disapproval.

Table 17. 1978 RTI Study: Percentages of 10th–12th Graders at Each Drinking Level by Number of Peers Respondent "Hangs Around with" Who Drink at Least Sometimes

Drinking	Number of Peers Who Drink Sometimes					
Level	None	One or Two	Several	Most of Them	All of Them	Total
Abstainer	70.4	54.0	32.0	11.7	6.2	24.8
Infrequent	10.5	14.5	12.6	5.3	1.9	7.7
Light	11.1	18.3	23.0	21.4	12.0	18.4
Moderate	3.9	8.0	16.0	21.6	19.3	16.7
Moderate/heavier	2.9	4.5	10.9	22.4	28.2	17.5
Heavier	1.2	0.7	5.6	17.6	32.4	15.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
(N)	327	685	951	1,568	1,147	4,678

Personality Correlates

A wide range of personality variables have been investigated in relation to alcohol use. Mixed results have been obtained for variables like alienation and self-esteem. Internal-external locus of control does not seem to be related to alcohol use. Tolerance toward deviance has been demonstrated to be directly related to prevalence and level of drinking. Various personality inventory variables seem to be independently related to heavier and problem drinking, e.g., pessimism, unhappiness, boredom, aggressiveness, frustration, sociability, permissiveness, impulsiveness, distrust, cynicism, irresponsibility, inflexibility, and dissatisfaction. Some, but not all, of the personality variables are also related to level of alcohol use. The similarities among those personality variables found to be related to heavier drinking suggest that these may be types of personalities that are predisposed to drink more heavily, though there is no direct evidence for this conclusion from studies with adolescents.

Table 18. 1978 RTI Study: Percentages of 10th–12th Graders at Each Drinking Level by Peers' Attitudes About Teenaged Drinking

	Peers' Attitude About Teenaged Drinking			
Drinking Level	Approve	Neither Approve nor Disapprove	Disapprove	Total
Abstainer	14.4	21.6	68.0	22.7
Infrequent	5.6	9.0	12.8	7.7
Light	17.5	22.3	8.7	18.7
Moderate	19.1	17.6	4.9	17.1
Moderate/heavier	22.2	16.7	4.4	18.1
Heavier	21.2	12.8	1.2	15.7
Total	100.0	100.0	100.0	100.0
(N)	2,111	1,874	427	4,412

Correlated Behavioral Factors

Participation in school activities, academic achievement, church attendance and religious involvement, employment, and use of drugs other than alcohol have also been compared with alcohol use. Membership in organizations, number of organizations in which one participates, and holding office in an organization have been used to reflect social participation. Grades and college aspirations have been used to operationally define academic achievement. Frequency of church attendance and importance of religion, attitudes about religion, identification with religion, religiosity, and participation in church activities have been investigated. Other drug use generally has been examined through measures of use of marijuana or counts of other drugs used.

Findings from prior studies are inconsistent with respect to the relationship between participation in school and social activities and alcohol use. Moderate relationships have been consistently demonstrated, but the direction varies, suggesting the influence of other variables on both social participation and drinking. A weak negative relationship has been found between academic achievement and prevalence and level of drinking. Church attendance and religious involvement were negatively related to prevalence of drinking, though not consistently to level of drinking. Both employment and number of working hours were related to level of alcohol use, although the number of studies that examined this relationship was small. Use of marijuana has been shown to be directly correlated with both prevalence and level of alcohol use, though not all drinkers use this or any other drugs. However, it was rare to find users of marijuana who did not also use alcohol. A similar but much weaker relationship was found between alcohol use and use of other illicit drugs (Eisterhold et al. 1979; Johnston et al. 1979; Rachal et al. 1975; Wechsler and Thum 1973).

In the 1974 and 1978 RTI studies, academic achievement was weakly related to drinking level. Although lower drinking levels and higher grades do not necessarily go together (probably because grades depend so heavily on factors that are not controlled here), the heaviest drinkers are about three times more likely to receive the lowest grades than the highest grades (table 19). Marijuana use was strongly related to drinking level among teenagers (table 20), with alcohol abstainers also tending to abstain from marijuana. Those in the top two drinking levels were more than 10 times as likely to have used marijuana in the last 6 months than were abstainers. Interestingly, there is little evidence that marijuana use among teenagers increased between 1974 and 1978.

Table 19. 1978 RTI Study: Percentages of 10th–12th Graders at Each Drinking Level by Academic Achievement

	Grades Student Usually Gets			
Drinking Level	As and Bs	Bs and Cs	Cs, Ds, Fs	Total
Abstainer	31.9	21.7	18.5	24.9
Infrequent	9.6	7.0	4.9	7.6
Light	19.6	19.5	16.3	18.9
Moderate	15.5	17.7	16.2	16.6
Moderate/heavier	15.7	17.8	19.4	17.3
Heavier	7.7	16.4	24.7	14.8
Total	100.0	100.0	100.0	100.0
(N)	1,816	2,113	913	4,842

Table 20. 1978 RTI Study: Percentages of 10th–12th Graders at Each Drinking Level by Marijuana Use During Past 6 Months

	Marijuana Use Past 6 Months			
	None Drinking Level	Once a Month or Less	More than Once a Month	Total
Abstainer	39.9	5.9	3.5	25.5
Infrequent	10.8	6.2	1.4	7.7
Light	20.1	26.1	10.1	18.2
Moderate	13.7	23.7	20.4	16.8
Moderate/heavier	9.8	20.2	32.1	17.2
Heavier	5.8	17.9	32.5	14.7
Total	100.0	100.0	100.0	100.0
(N)	2,696	651	1,314	4,661

Summary

Prevalence and level of alcohol use among adolescents are related to a large number of variables. The strongest univariate relationships with alcohol use have been demonstrated for peer influence, specifically peer attitudes toward drinking and peer drinking behavior, and for parental influence, specifically parents' attitudes and behaviors related to their own and teenagers' drinking. Behavioral factors, such as academic achievement and religious involvement, and contextual factors, such as drinking location and companions, are also related to alcohol use. Least strongly related to drinking are sociocultural and personality variables. However, the lack of studies that have investigated the simultaneous influences of these different categories of variables using multivariate analytic techniques limits the usefulness of these findings to simple description of adolescent drinking.

This brief literature review and presentation of data on selected correlates of adolescent alcohol use from the recent RTI studies reveals three rather specific findings and at least one general conclusion. First, the general descriptive results of 25 years of research on teenaged drinking are confirmed nationally, both with respect to expected correlates and with respect to those correlates most strongly related to drinking levels among adolescents. Second, this confirmation underscores the need for research aimed at specifying the simultaneous operation of multiple factors during adolescence and provides encouraging evidence that local studies, like Jessor and Jessor's (1977) longitudinal study of high school students, can cost-effectively produce findings with general applicability. Finally, the persistence of relationships over a 4-year period, coupled with the consistency of findings between these and other studies, suggests that adolescent alcohol use is a developmental phenomenon with which all teenagers must deal.

More generally, it is apparent that, to guide, interpret, and make fuller use of the mass of descriptive information available about adolescent alcohol use, researchers need some integrating framework. Perhaps the most systematic and comprehensive formulation for explaining adolescent alcohol use is in the work of Jessor and his associates (Jessor and Jessor 1977; Jessor et al. 1968). Basically, Jessor et al. specified three interacting systems: the behavior, the personality, and the environment. Jessor et al. implied that, like other problem behaviors, drinking by adolescents is a learned response to, and is reinforced by, variables in the personal and environmental systems. Problem-behavior theory formed a major part of the conceptual framework for the 1974 and 1978 RTI studies. Although only a subset of the variables from the larger framework of problem-behavior theory was included in the study instruments, analyses of the 1974 national sample data have provided strong empirical support for the problem-behavior perspective in general and specific tenets of the theory in particular (Donovan and Jessor 1978; Jessor et al. 1980). These analyses have helped advance our understanding of adolescent drinking beyond that provided by univariate or bivariate correlations of the type discussed previously in this section. The multivariate, theoretically guided analysis of the 1974 RTI study data has enhanced our understanding of adolescent drinking, and it has important policy implications. Donovan and Jessor (1978) concluded that:

> problem drinking is part of a syndrome, which suggests that attempts at an alcohol-specific understanding of problem drinking may be parochial and, more serious perhaps, that alcohol-specific prevention efforts may be futile. The notion that problem drinking is part of a more general behavioral syndrome is reinforced by the fact that other problem behaviors, such as deviance and use of marijuana, are equally well accounted for by the same pattern of psychosocial variables. The stance that is supported by the data is that a common set of psychosocial dimensions accounts for both problem and nonproblem drinking, and that variation on those dimensions characterizes adolescents who engage in one or the other kind of drinking. (p. 1521)

Alcohol Misuse by Adolescents

Misuse of alcohol by people who are 12-17 years old has recently become a primary social concern. For example, Mayer and Filstead (1980*a*) noted that "within the last decade adolescent misuse of alcohol has become a major social problem in our society. Many segments of society have expressed concern about the consequences of this alcohol misuse upon various dimensions of social life, and especially upon the psychosocial development of the adolescent" (p. XV). Moreover, adolescent alcohol misuse has been seen as an important research area because of the possible relationships between drinking behavior in youth and drinking behavior and alcohol abuse later in life.

Despite the wide interest in and concern about adolescent alcohol misuse, it is still difficult to integrate much of the available research into statements that are either theoretically useful or applicable to prevention and treatment programs. One basic and critical problem with research on adolescent alcohol misuse is the failure to define consistently what is being investigated. We will, therefore, begin by presenting an explicit definition of alcohol misuse to be applied to the 1974 and 1978 RTI studies data.

Definition of Alcohol Misuse

The range of definitions of alcohol misuse or problem drinking among adolescents includes definitions in which any drinking is referred to as a problem to definitions that equate alcohol misuse with alcoholism. Marden and Kolodner (1976) noted that to some researchers any adolescent drinking is misuse because it is illegal for minors to purchase alcohol. Other researchers have attempted to apply definitions of adult alcoholism to adolescents. However, as Blane and Hewitt (1977) and Schuckit (1978) concluded, the chronic physical and social problems that are part of the generally accepted criteria for establishing adult alcoholism rarely pertain to the behavioral and social correlates of drinking by youths. Young people who misuse alcohol rarely experience the same kinds of severely debilitating problems. Bacon (1976) presented several factors that have contributed to the failure to adequately define alcohol misuse in youth. These include (a) the assumption that drinking per se is a problem; (b) the complex social factors involved in defining behavior problems; (c) the failure to remember that the relationship between current and later alcohol problems is a subject for empirical investigation, not assumption; (d) the failure to remember that problems are specific and time related; (e) the assumption that problem areas are interchangeable; and (f) the failure to define empirically what alcohol-related problems are, i.e., how directly alcohol is associated with the experience of a particular event that is defined negatively.

Mayer and Filstead (1979) argued that many difficulties might be overcome by empirically defining adolescent alcohol misuse. Their approach was to construct a 14-item scale based on previous investigations of adolescent alcohol misuse, choosing variables that had been shown empirically to be the best discriminators between users and misusers of alcohol. The 14 items included information on frequency and recency of drinking alcohol; motivations for drinking; and the environmental, social, and psychological correlates of drinking. Validation of this scale (called the Adolescent Alcohol Involvement Scale, or AAIS) suggests that it could be used productively to arrive at some consistency in definition across investigations.

The definition of alcohol misuse that will be applied to the data presented in this section is based on the definition of problem drinking used by Donovan and Jessor (1978) in their analysis of the 1974 RTI study data to test Jessor and Jessor's (1977) problem-behavior theory. Donovan and Jessor used two sets of criteria to define problem drinking. The first criterion set involved frequency of drunkenness during the last year. In both the 1974 and the 1978 RTI studies, respondents were asked, "During the last year, about how many times have you gotten drunk or very, very high?" The response categories were none, once, 2 or 3 times, 4 or 5 times, 6 to 10 times, once a month, twice a month, and once a week or more. The second criterion set concerned the experience over the last year of alcohol-related negative consequences in areas that are relevant to adolescents in the United States. In both surveys respondents were asked, "During the past year, how many times have the following happened to you?" Negative consequences items were "You've gotten into trouble with your teachers or principal because of your drinking. You've gotten into difficulties of any kind with your friends because of your drinking. You've driven when you've had a good bit to drink. You've been criticized by someone you were dating because of your drinking. You've gotten into trouble with the police because of your drinking." For the five problem area items, frequency of occurrence responses included none, once, 2 or 3 times, 4 or 5 times, 6 to 9 times, and 10 or more times. The criteria of the drunkenness question and the five negative consequences questions were used to define alcohol misusers as follows: Drunkenness at least six times in the past year, or negative consequences two or more times in the past year in at least three of the five areas, or both.

Although this definition, like the vast majority of other alcohol misuse definitions, is arbitrary, it is explicit and based on objective criteria. It can thus be examined empirically. In using this definition in their analyses of the 1974 RTI data, Donovan and Jessor (1978) compared it with two other definitions of alcohol misuse. One definition emphasized drunkenness and the other emphasized the occurrence of negative consequences. Analyses showed that all three definitions similarly distinguished alcohol users from misusers on a variety of psychosocial factors.

Abstention, Use, and Misuse of Alcohol in the 1974 and 1978 Samples

On the basis of the Donovan and Jessor (1978) definition of problem drinking, we classified the 10th to 12th graders in the 1974 RTI ($N =$ 5,935) and the 1978 ($N =$ 4,918) studies as abstainers, alcohol users, or alcohol misusers. *Abstainers* were individuals who reported *never* having had more than one or two drinks and drinking no alcohol during the last year. *Alcohol users* were individuals who drank during the past year but who were not defined as misusers of alcohol. Individuals who could not be classified due to missing data or individuals who were former drinkers but current abstainers were treated as missing data and were excluded from the analyses. The "former drinker" cases reported having more than one or two drinks in their lifetimes but consuming no alcohol during the past year. In 1974, the number of such missing cases was 507 (9.5 percent), and in 1978, the number of missing cases was 445 (9.0 percent). In the analyses of alcohol misuse that follow, any total sample size listed as fewer than 5,935 in 1974, or fewer than 4,918 in 1978 is due to cases missing in the drinker classification variables and to missing data in the other variables that are being analyzed. For convenience in analytical procedures, all analyses herein are based on *unweighted* values. Distributions between weighted and unweighted values are not significantly different. Percentages are based on the total number of cases that have analyzable data, not the total sample sizes.

The overall prevalence rates for abstainers, alcohol users, and alcohol misusers in the 1974 and 1978 samples were comparable (table 21). In 1974, 27 percent of 10th-12th graders were classified as misusers. By 1978, this proportion had increased slightly to 31.2 percent.

The Drinking Status Definition. An important question concerns what proportion of the participants were classified as alcohol misusers (a) due to the drunkenness criterion, (b) due to the negative consequences criterion, or (c) due to the drunkenness and negative consequences criteria combined. The data in table 22 indicate that for both years most respondents defined as misusers were so classified because of their reports of frequency of drunkenness during the past year. If frequency of drunkenness was the reason that those who were defined as misusers were so classified, the question arises as to whether those individuals reported some alcohol-related negative consequences in any of the five consequences areas. To investigate this question, we distributed those who were classified as alcohol misusers because they met the drunkenness criterion according to their reports of having at least one occurrence of negative consequences for each of the five problem areas (table 23). In 1974, the majority (77.6 percent) of individuals who were classified as misusers because of frequency of drunkenness experienced at least one occurrence of negative consequences in one problem area. In 1978, the comparable figure was slightly lower (69 percent). It appears that there was slightly less problem involvement among misusers who met the drunkenness criterion in 1978 than respondents who met that criterion in 1974.

Table 21. 1974 and 1978 RTI Studies: Percentages of Abstainers, Alcohol Users, and Alcohol Misusers, Among 10th–12th Graders

Drinker Classification	1974	1978
Abstainer	18.6	17.2
Alcohol user	54.3	51.7
Alcohol misuser	27.1	31.2
(N)	5,428	4,473

Table 22. 1974 and 1978 RTI Studies: Percentages of 10th–12th Graders Classified as Misusers Due to Drunkenness, Negative Consequences, or Both

Misuser Criterion	1974	1978
Drunkenness only	87.4	93.3
Negative consequences only	2.4	1.2
Drunkenness and negative consequences	10.2	5.5

Table 23. 1974 and 1978 RTI Studies: Negative Consequences Experienced by 10th–12th Graders Classified as Misusers Due to Drunkenness Criterion

Number of Problem Areas Reported[1]	1974	1978
0	22.4	31.0
1	33.4	34.8
2	29.1	24.8
3	12.7	8.0
4	2.1	1.4
5	0.2	0.2

[1] One or more occurrences for each problem area: gotten in trouble with teachers or principal, had difficulties with friends, driven after having a "good bit" to drink, been criticized by a date, gotten in trouble with the police (see section in text on Definition of Alcohol Misuse).

Sociodemographic Factors and Drinking Status

Overall rates of alcohol misuse by adolescents mask possible differences associated with various sociodemographic factors. Table 24 shows the distribution of the 1978 male and female alcohol misusers as a function of age, ethnicity, religious affiliation, and socioeconomic status (SES). In table 24 and most subsequent tables, only the 1978 RTI study data are displayed. Differences that exist in the 1974 and 1978 study data on the variables are shown or discussed. Compared with 1974, in 1978, there were slightly higher proportions of both male and female misusers. As expected, there were more male than female misusers across all variables. Misuser status was generally related to age among males. Surprisingly, however, drinking status did not appear to be related to age among females. There were no significant differences in the proportions of female misusers for ages 15 to 18. Differences in misuser status as a function of ethnicity, religious affiliation, and SES were generally consistent with the literature (Blane and Hewitt 1977).

Correlates of Adolescent Alcohol Misuse

Although the descriptive data presented above may be of interest in their own right, they do not address the critical questions of how much alcohol misusers drink, where they drink, and the behavioral, social, psychological, and environmental correlates of such drinking. This section presents an investigation of this aspect of adolescent alcohol misuse. Earlier we identified the correlates of adolescent alcohol misuse as a major research area. Clearly, definitions are merely a communication convenience; what is central is how the people who are defined in a particular way behave and the correlates of that behavior. The work done to date has been poorly integrated, with some notable exceptions (Akers 1977; Jessor and Jessor 1977; Maddox 1962; Maddox and McCall 1964; Mayer and Filstead 1980*b*; Zucker 1976, 1979; Zucker and Barron 1973; Zucker and Devoe 1975). What can be obtained from the adolescent alcohol misuse literature is a cataloging of correlates of the various definitions of misuse that have been used. These include drinking behaviors, other drug use, sociodemographic factors, attitudes and knowledge, environmental factors, and parent and peer influence (Barnes 1980; Marden and Kolodner 1976; Mayer and Filstead 1980*a*; Schuckit 1978; Walker et al. 1978). Our approach is to use the 1978 study to investigate selected correlates of the misuse of alcohol among adolescents and, where appropriate, to compare the findings with the 1974 RTI study and with prior research. This approach takes advantage of a major source of new data. Our hope is that the descriptive information and basic data will form a foundation for more intensive analyses that can contribute to the development of theory and to policy decisions about adolescent alcohol misuse.

Behavioral and Psychological Correlates of Drinking

One aspect of any definition of alcohol misuse is the consistency of the researcher's or clinician's definition with the labeled person's perception of his or her behavior. In the RTI studies, respondents who were drinkers were asked how much of a problem drinking had been for them in the past year. In both years, a greater proportion of males and females defined as misusers compared with users perceived that drinking had been at least a mild problem during the past year. However, most of these respondents felt that drinking had not been a problem. Of further interest are the drinking history of adolescent alcohol misusers, their current drinking and other drug use, and the personal and environmental consequences of drinking alcohol for them. In both RTI studies a number of items pertained to these questions. The first item relates to the age at which respondents said that they had had their first drink. In both 1974 and 1978, misusers reported that they had had their first drink at younger ages than did users. Over half of the misusers said they had had their first drink by the time they were 13 years old, compared with about one-third of the users. The 1978 data for age at first drink did not show significant variation from the 1974 findings for boys or girls.

Thus, it appears that alcohol misusers tend to begin drinking at an earlier age than users, and boys generally begin drinking earlier than girls. There are also considerable differences in current drinking between alcohol users and misusers (table 25). Table 25 shows the

Table 24. 1978 RTI Study: Percentages of Male and Female Alcohol Misusers[1] in 10th–12th Grades as a Function of Age, Ethnicity, Religious Affiliation, and Socioeconomic Status (SES)

Sample	Percentage Misusers					Total
	Age[2]					
	15	16	17	18		
Males	31.3	35.9	39.6	43.5		37.8
Females	24.2	23.8	28.6	24.7		25.5
	Ethnicity[3]					
	Spanish American	White and Other	Black			
Males	29.3	39.7	23.6			37.8
Females	14.8	27.9	10.3			25.5
	Religious Affiliation					
	Catholic	Baptist	Other Protestant	Jewish	No Religion	
Males	43.6	37.4	31.6	31.4	40.1	37.6
Females	29.3	18.1	22.4	36.4	31.7	25.5
	Socioeconomic Status[4]					
	1(Low)	2	3	4(High)		
Males	39.5	35.9	37.9	38.5		37.8
Females	17.3	24.9	26.3	26.0		25.5

[1] Misusers are defined as those experiencing drunkenness at least six times in the past year, or negative consequences two or more times in the past year in at least three of the five areas, or both. (See section in text on Definition of Alcohol Misuse.)

[2] First and last age categories are collapsed. "15" includes respondents 12–15 years old, and "18" includes respondents 18–24 years old.

[3] Ethnicity variable for 1978 includes American Indians and Orientals in "White" category. Values in this category are thus primarily due to white respondents.

[4] SES is a 10-category variable based on parents' education and occupation; it was collapsed to four categories for this purpose.

mean daily ethanol consumption in beer, wine, and distilled spirits and the total daily ethanol consumption. The finding that misusers drank substantially more than alcohol users was consistent across sex and for the 2 study years.

Table 25. 1978 RTI Study: Mean Ethanol Consumption (in ounces) by Beverage of Male and Female Users and Misusers in 10th–12th Grades[1]

Sex and Drinking Categories	Beer	Wine	Distilled Spirits	Total Consumption
Male				
Alcohol user (*N*= 969)	0.13	0.05	0.07	0.26
Alcohol misuser (*N*= 776)	0.76	0.14	0.35	1.25
Female				
Alcohol user (*N*= 1,342)	0.05	0.05	0.08	0.17
Alcohol misuser (*N*= 618)	0.35	0.21	0.35	0.91

[1] Mean ethanol consumption is based on reports of the frequency with which a beverage is consumed and the amount of it typically drunk on those occasions.

Table 26 examines the alcohol user-misuser classification of the 1978 study participants who drank various amounts. A clear relationship between higher levels of alcohol consumption and misuser classification emerges. For males, about 85 percent of those classified as "heavier" drinkers were classified as misusers. For females, about 88 percent of the "heavier" drinkers were classified as misusers. It thus appears that alcohol misuse is directly and strongly related to levels of alcohol consumption.

Table 26. 1978 RTI Study: Percentages at Each Drinking Level Classification of Male and Female Alcohol Users and Misusers in 10th–12th Graders

Sex and Drinking Categories	Drinking Level: Infrequent	Light	Moderate	Moderate/ Heavier	Heavier	Total
Male						
Alcohol user	96.7	91.6	68.5	41.0	14.8	53.0
Alcohol misuser	3.3	8.4	31.5	59.0	85.2	47.0
(N)	122	310	340	420	458	1,650
Female						
Alcohol user	97.4	91.7	73.4	39.3	12.3	66.2
Alcohol misuser	2.6	8.3	26.6	60.7	87.7	33.8
(N)	228	503	458	422	219	1,830

The RTI data also showed that alcohol misusers reported relatively heavy involvement in marijuana use. Virtually all abstainers reported that they had not used marijuana during the past 6 months. The majority of male and female alcohol users in 1974 and 1978 reported that they had not used marijuana during this time (males: 67.0 percent and 65.8 percent; females: 65.4 percent and 67.1 percent, respectively). In contrast, in 1974, 74.7 percent of the male misusers reported using marijuana at least once in the past 6 months, with 44.5 percent using this drug at least 11 times. In 1978, these percentages were 78.8 percent and 62.4 percent, respectively. Similarly, in 1974, 81.9 percent of the female misusers reported using marijuana at least once, of whom 44.5 percent reported using it 11 or more times. In 1978, the data showed that 86.6 percent of the female misusers used marijuana at least once, of whom 67.2 percent reported using it at least 11 times.

Alcohol-Related Consequences

Earlier in this section we presented an analysis of the occurrence of negative consequences in the five problem areas among alcohol misusers who were so defined because of their reports of frequency of drunkenness during the past year. A common criticism of the definitions of "problem drinking" or "alcohol misuse" is lack of data as to what alcohol-related problems these definitions are based on and the extent of such problems. It has been argued, for example, that frequently an adolescent is labeled a "problem drinker" as a result of few related negative events (e.g., O'Gorman et al. 1977).

To further examine this, the five problem areas defined earlier and assessed in the 1974 and 1978 studies were analyzed to compare male and female alcohol users and misusers. The percentages of respondents who reported at least one occurrence of a problem during the past year were computed. Among respondents reporting at least one occurrence of a given problem, the percentage who reported *only* one occurrence was also computed. These analyses are summarized for male and female users and misusers in 1974 and 1978 for each of the five problem areas (table 27). As table 27 reveals, the proportion of misusers who reported at least one occurrence of any of the five problem areas was substantially higher than the proportion of users who did. This, in part, is to be expected because one way a respondent could be defined as a misuser was through reports of alcohol-related problems. However, these data show much more clearly than the definition would suggest that misusers have disproportionately experienced alcohol-related negative consequences. Second, there were differences in proportions as a function of the problem area, which held for both users and misusers. For some problem areas, only a small minority of misusers reported at least one occurrence, but for others, more than half reported such problems. These conclusions pertain to both years and both sexes. There also was a wide range in the proportions of one time only events in the problem areas. Again, in 1974, of the 12.9 percent of the male misusers who reported at least one occurrence of trouble in school, 55.3 percent reported only one such occurrence (data for females in 1974 and for males and females in 1978 were similar to the 1974 data for males). However, among 68.0 percent who reported that they drank and drove at least once, 91.1 percent drank while driving more than once. The data also show that, for both users and misusers in 1974 and 1978, males generally reported a higher frequency of problem occurrence.

Other Correlates

Thus far, we have concentrated on drinker status and the alcohol-related behaviors, perceptions, and consequences for individuals classified as a particular drinker "type." Another question concerns the environment in which drinking (or abstinence) occurs. This is a particularly critical area for investigation for policy decisions because of the potential utility of modifying the environment to support nonabusive drinking. Accordingly, a considerable portion of the research on the correlates of adolescent alcohol use and misuse has focused on environmental factors. Two sets of factors stand out: peer and parental influences. Moreover, there seems to be an unusual degree of agreement about the importance of these factors. Marden and Kolodner (1976) concluded that "the reasons for alcohol use by adolescents are still not fully clear, but they are obviously intertwined with the attitudes and behavior of both parents and peers" (p. 44). Walker et al. (1978) argued that parental attitudes toward drinking are the best predictors of adolescent drinking. In summarizing his extensive review of peer influences on adolescent alcohol use, Barnes (1980) stated that all of the studies that have investigated peer influence and alcohol use have found a relationship between them. The 1974 and 1978 RTI studies were consistent with the literature and across sex and year, because drinker status was directly related to parents' and peers' attitudes toward drinking and their drinking practices.

Another important variable is the setting in which drinking occurs. Although some reviewers (Marden and Kolodner 1976) have alluded to the contribution of the setting to adolescent drinking behavior, there has been little systematic investigation of the setting to match studies done with older drinkers (Harford 1979). Several of these drinking settings were examined with the 1974 and 1978 study data, and contexts of drinking were found to be related to drinker status. Again, the data were consistent across sex and year.

Finally, an analysis of measures of attitudes and behaviors that are not directly related to drinking showed that religious involvement, Table 27. 1978 RTI Study: Percentages of Male and Female Alcohol Users and Misusers in 10th–12th Grades by Occurrences in the Five Problem Areas

Sex and Drinking Categories	Problem Area Related To Drinking									
	Trouble with Teachers or Principal		Difficulties with Friends		Driving After Having a "Good Bit" to Drink		Criticism from a Date		Trouble with the Police	
Male										
Alcohol user	1.2[1]	85.7[2]	12.3[1]	72.3[2]	20.6[1]	40.2[2]	8.2[1]	58.2[2]	4.1[1]	90.0[2]
Alcohol misuser	9.5	60.3	34.2	35.6	59.4	12.0	20.8	45.3	25.4	52.0
(N)	1,739		1,738		1,737		1,730		1,739	
Female										
Alcohol user	0.97	84.6	12.8	68.4	11.9	61.6	9.1	67.2	2.4	78.1
Alcohol misuser	4.9	83.3	36.2	44.4	41.7	25.3	18.0	49.5	11.5	62.0
(N)	1,956		1,955		1,955		1,946		1,956	

[1] Represents the percentage of alcohol users in the sample who reported at least one occurrence of alcohol-related trouble with teachers or principal during the past year.

[2] Represents the percentage of those reporting only one occurrence among respondents who reported at least one occurrence.

deviance, and school achievement discriminated reliably among abstainers, users, and misusers.

General Summary

An explicit definition of alcohol misuse among youth based on the criteria of frequency of drunkenness and experience of (perceived) alcohol-related negative consequences was shown to discriminate among respondents. The data revealed that a slightly higher proportion of people was classified as misusers in 1978 than in 1974. Importantly, regardless of which criterion the respondents met to be classified as alcohol misusers, these subjects had experienced a relatively high frequency of alcohol-related negative consequences. Generally, the results of the two studies were consistent and in agreement with the literature in showing differences between users and misusers in a variety of factors, including drinking behavior and personal and environmental correlates of drinking. Moreover, differences between the sexes were typically in level, not in type, of relationship.

The stability of the data suggest that these descriptive, univariate findings have validity. It is clear that a substantial proportion of adolescents drink and a considerable proportion of drinkers apparently engage in high-risk behaviors when they consume alcohol. This information is critical for the policymaker, because it identifies current and potential intervention targets. In order to expedite the development of effective intervention programs, further attempts at integrating these correlational data into theory are required. Substantial progress in this direction has been made through use of the RTI studies data by Jessor and his colleagues (Donovan and Jessor 1978; Jessor et al. 1980). More progress will be made as Jessor's problem-behavior theory and other theories are tested further, developed, and refined. Work in these areas is currently needed in regard to adolescent drinking. That work may ultimately result in effective prevention and treatment efforts through a fuller understanding of adolescent drinking.

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Chapter 3

An Epidemiologic Perspective on Alcohol Use and Abuse in the United States*

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Abstract

The epidemiologic research needed for an understanding of the magnitude, patterns, and trends of alcohol use and abuse is at its earliest stages. Efforts are currently under way to collect and analyze the large existing data sets on alcohol use and abuse, and to develop measurement indices and analytic techniques for their use. Results of some of the earliest phases of this research are discussed in this chapter and summarized below.

Overall, the decade of the 1970s appears to have been a time of transition in alcohol use and abuse in the United States. The rapid rise in alcohol consumption rates in earlier decades has slowed, but apparent consumption still rose 8 percent, reaching the highest level in more than 100 years. Beer sales have risen so that per capita consumption of ethanol from beer nearly equals that from wine and liquor combined.

Regionally, patterns of per capita alcohol consumption are shifting, with the largest increases in southern and western States. All States increased in per capita consumption except for Alaska, Washington, D.C., and four eastern industrial States. Nevada now leads the Nation in apparent alcohol consumption rates (though these rates were not corrected for Nevada's large tourist populations) and is second in cirrhosis mortality rates among its residents.

Alcohol-related mortality for several selected causes appears to be remaining relatively constant in the United States. One bright spot is that cirrhosis mortality rates have declined each year since reaching a peak in 1973. Unfortunately, the rise in other alcohol-related mortality rates (especially highway accidents) has roughly compensated for the decrease in cirrhosis mortality rates.

Males still far outnumber females in the measurable use and abuse of beverage alcohol. Self-reported alcohol consumption rates are nearly four

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times higher among males than females. Cirrhosis morbidity and mortality rates are more than twice as high among males as females. Alcohol treatment in federally sponsored alcohol treatment programs, as recorded in NAPIS files, is nearly five times higher for males than females. Alcohol-related discharges of males from short-stay hospitals are more than triple those for females, even though males account for only 40 percent of all short-stay hospital discharges. Jail convictions for which the offender was drinking heavily prior to the crime were four times higher among males than females, as were driver involvements in highway fatalities where alcohol involvement was reported.

Cirrhosis mortality rates are disproportionately high among black Americans, particularly in the seven major cities (Baltimore, Chicago, Detroit, Los Angeles, New York, Philadelphia, and Washington, D.C.) which account for half of the cirrhosis deaths among blacks. Rates among black males, aged 25 to 34, in these cities are as much as 10 times higher than they are for white males of the same age. For all ages, cirrhosis mortality rates among black Americans are nearly twice those for white Americans.

There were at least 910,000 discharges (2.5 percent of all discharges) from short-stay hospitals in 1975 which were directly linked to alcohol-related causes. Of these, 424,000 discharges had first-listed diagnoses of "alcoholism" (ICDA Code 303). Another 124,000 discharges had first-listed diagnoses of cirrhosis of liver or alcoholic psychosis. The remaining 362,000 alcohol-related discharges included neuroses, symptomatic and chronic ischemic heart disease, gastritis, duodenitis, diseases of the pancreas and liver, diabetes, pneumonia and other respiratory diseases, esophageal varices, vitamin deficiencies, trauma, and other injuries—all as first-listed diagnoses accompanied by alcohol-related diagnoses.

In VA hospitals, the proportion of alcohol-related discharges to all discharges was much higher. For example, 17 percent of all discharges from VA hospitals were associated with alcoholism, as compared with 1 percent in short-stay non-VA hospitals.

NIAAA-sponsored epidemiologic research is continuing; areas of high interest are discussed at the end of this chapter. Future results of this research should bring significant improvements in the measurement and understanding of alcohol use and abuse at National, State, and local levels and for specific population groups. Ultimately, these should provide the data and analytic aids needed for improved planning and allocation of resources and the prevention and treatment of alcohol-related problems—particularly among those groups at highest risk for alcohol abuse and alcoholism.

Introduction

The role alcohol plays in the Nation's health is complex, frequently ambiguous, and difficult to measure. The body of data that may aid in a more thorough assessment of the nature of this role continues to grow. Research studies, both prospective and retrospective, continue to probe those aspects of how people choose to live that affect the quality of their lives. Special surveys to elicit information on the patterns and levels of alcohol use and abuse among specific target populations are adding greatly to the understanding of alcohol-related problems.

As an aid to understanding the primary areas of interest in describing the "at risk population," in measuring incidence and prevalence, and in identifying the principal surveillance points where more accurate measurement will yield a better understanding of alcohol-related problems in society, a general model of the dynamics of drinking has been developed (Creative Socio-Medics Corporation 1979). The values given in this model derive from diverse surveys and indicator data sets (U.S. Department of Commerce 1979; U.S. Department of Health, Education, and Welfare (n.d.*d*). It is in no manner comprehensive; however, it can serve to better identify the major categories of data, of critical measurement, and of population components essential to a thorough description of alcohol use and abuse (see figure 1).

Some of the interrelationships described in this chapter are ecologic in that they depend on data not linked directly to the individuals who are being characterized. For example, per capita consumption, based on sales and tax data, implies a mean level of alcohol use for those to whom the data apply. Mortality rates (Creative Socio-Medics Corporation 1979; Polich et al. 1980; U.S. Department of Health, Education, and Welfare 1974), similarly, are based on deaths per 100,000 people. If a correlation exists between apparent consumption and mortality, it is an ecologic association only. Few national data sets, with the exception of the surveys cited here, allow analysis of individual-linked data. While ecologic analysis yields highly suggestive interrelationships, more rigid experimental studies which obtain both consumption (agent) and health or outcome (effects) data for each person are necessary for more definitive assessment of such apparent correlations.

The following sections are intended to provide a general framework within which alcohol abuse and alcoholism may be examined primarily from a national epidemiologic perspective. Discussion of the milieu of alcohol-related problems, the availability, apparent consumption, and, where possible, actual consumption itself are presented under Patterns of Alcohol Use. Particular attention has been directed toward comparison of apparent consumption, as derived from alcohol sales and tax data, and reported consumption derived from national survey data.

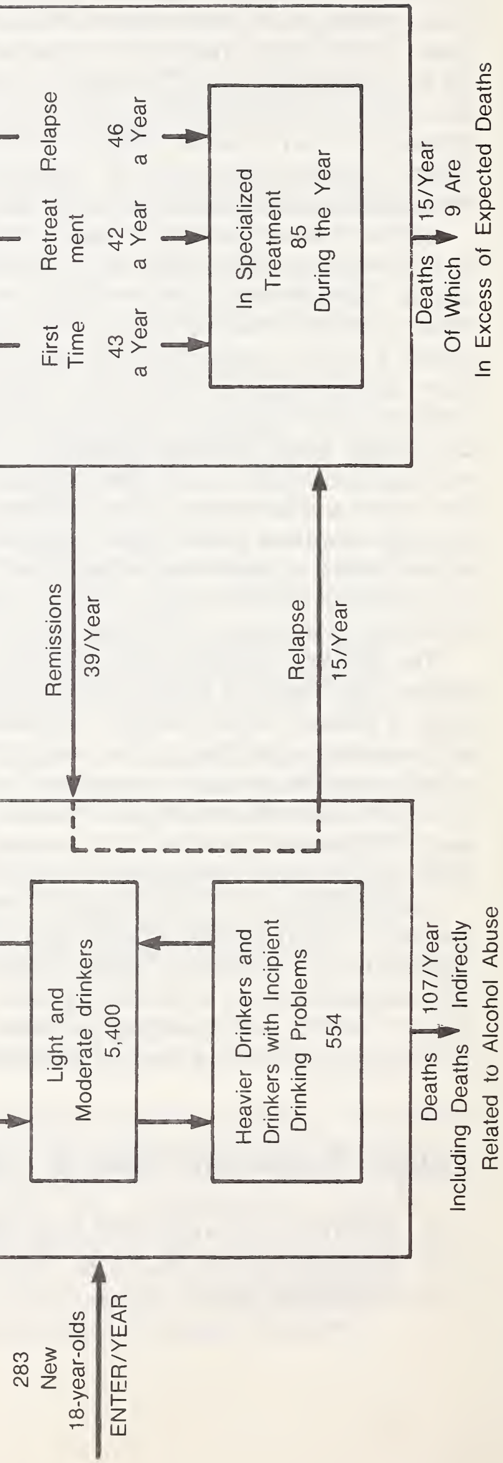
Later sections of this chapter cover: (1) the medical or health sequelae, both demonstrated and suspected; (2) certain societal consequences, including highway traffic accidents and criminality; and (3) new approaches in producing direct and synthetic estimates of the nature, extent, and changing patterns of risk associated with the use and abuse of beverage alcohol, and issues of continuing research.

Terms Frequently Used in This Chapter

- Ethanol—The volume of pure ethyl alcohol consumed, whether from beer, wine, or liquor. This term is used synonymously with *absolute alcohol*.

Figure 1. An Approximate Model of the Dynamics of Drinking and Problem Drinking[1] (Described in terms of a group of 10,000 adults, 18 and older)

[1] Estimates are based on 1976 population data, flow model data, and survey and alcohol sales data. They are intended for illustrative purposes only.



- Apparent Consumption—Alcoholic beverage consumption derived from official reports of States, tax-paid withdrawal records, or, in some cases, reports of sales by the beverage industry, and expressed in terms of the drinking-aged population in the geographic area for which the data apply.
- Self-Reported Consumption—As used in this chapter, self-reported consumption is the alcoholic beverage consumption reported by survey respondents and weighted to represent national populations.
- Per Capita Consumption Rates—Per capita consumption rates are usually expressed as quantity per person 14 years and older. Survey base population ages are as specified.
- Incidence—The number of new cases of a disease that occur within a specified time period, within a defined population.
- Prevalence—The proportion of a population that may be said to have a given disease at a given time.
- BAC—Blood alcohol concentration, a measure of the percentage of ethanol in blood, determined either directly from blood serum or indirectly, using breath analyzers.

Patterns of Alcohol Use

Patterns of alcohol use and abuse vary substantially by characteristics of persons (such as age, sex, occupation, and ethnic group), by the availability of alcoholic beverages, by social and cultural patterns, and by contexts of drinking. During the 1970s, alcoholic beverages became more accessible in some States, with an increase in the number of outlets, longer hours of outlet operation, and the lowering of the legal drinking age (Gavin 1977). The price of alcohol to the consumer has risen less than most other consumer products during the decade. U.S. apparent per capita consumption of beverage alcohol based on State sales or taxation records has risen to the highest level in well over 100 years, and continues to rise. These patterns are described below for the Nation as a whole, then by region and State, and finally as estimated from self-reported consumption data.

National Trends in Apparent Alcohol Consumption (Sales) and Self-Reported Drinking

The decade of the 1970s presents interesting contrasts in the patterns of alcohol use and abuse. Apparent per capita alcohol consumption continued to rise, but at a slower rate than in the 1960s (table 1, figure 2). The relatively stable apparent consumption of about 2 gallons of ethanol per adult per year during the 1950s rose in the 1960s to more than 2.5 gallons per adult by the end of the

Table 1. Apparent Consumption of Alcoholic Beverages, in U.S Gallons per Capita, of the Drinking-Age Population,[1] U.S.A., 1850-1978

	Distilled Spirits		Wine		Beer		
Year	Beverage Volume	Ethanol Volume	Beverage Volume	Ethanol Volume	Beverage Volume	Ethanol Volume	Total
15 years+							
1850	4.17	1.88	0.46	0.03	2.70	0.14	2.10
1860	4.79	2.16	0.57	0.10	5.39	0.27	2.53
1870	3.40	1.53	0.53	0.10	8.7	0.44	2.07
1871-80	2.27	1.02	0.77	0.14	11.26	0.56	1.72
1881-90	2.12	0.95	0.76	0.14	17.94	0.90	1.99
1891-95	2.12	0.95	0.60	0.11	23.42	1.17	2.23
1896-1900	1.72	0.77	0.55	0.10	23.72	1.19	2.06
1901-05	2.11	0.95	0.71	0.13	26.20	1.31	2.39
1906-10	2.14	0.96	0.92	0.12	29.27	1.47	2.60
1911-15	2.09	0.94	0.79	0.14	29.53	1.48	2.56
1916-19	1.68	0.76	0.69	0.12	21.63	1.08	1.96
			-PROHIBITION-				
1934	0.64	0.29	0.36	0.07	13.58	0.61	0.97
1935	0.96	0.43	0.50	0.09	15.13	0.68	1.20
1936	1.20	0.59	0.64	0.12	17.53	0.79	1.50
1937	1.43	0.64	0.71	0.13	18.21	0.82	1.59
1938	1.32	0.59	0.70	0.13	16.58	0.75	1.47
1939	1.38	0.62	0.79	0.14	16.77	0.75	1.51
1940	1.43	0.67	0.01	0.16	16.29	0.73	1.56
1941	1.58	0.71	1.02	0.18	17.97	0.81	1.70
1942	1.89	0.85	1.11	0.20	20.00	0.90	1.95
1943	1.46	0.66	0.94	0.17	22.26	1.00	1.83
1944	1.00	0.76	0.02	0.17	25.22	1.13	2.06
1945	1.95	0.88	1.13	0.20	25.97	1.17	2.25
1946	2.20	0.99	1.34	0.24	23.75	1.07	2.30
1947	1.69	0.76	0.90	0.16	24.56	1.11	2.03
1948	1.56	0.70	1.11	0.20	23.77	1.07	1.97
1949	1.55	0.70	1.21	0.22	23.48	1.06	1.98
1950	1.72	0.77	1.27	0.23	23.21	1.04	2.04
1951	1.73	0.78	1.13	0.20	22.92	1.03	2.01
1952	1.63	0.73	1.22	0.21	23.20	1.04	1.98
1953	1.70	0.77	1.19	0.20	23.04	1.04	2.01
1954	1.66	0.74	1.21	0.21	22.41	1.01	1.96
1955	1.71	0.77	1.25	0.22	22.39	1.01	2.00
1956	1.31	0.81	1.27	0.22	22.18	1.00	2.03
1957	1.77	0.80	1.26	0.22	21.44	0.97	1.99
1958	1.77	0.80	1.27	0.22	21.35	0.96	1.98
1959	1.86	0.84	1.28	0.22	22.15	1.00	2.06
1960	1.90	0.86	1.32	0.22	21.95	0.99	2.07
1961	1.91	0.86	1.36	0.23	21.47	0.97	2.06
1962	1.99	0.90	1.32	0.22	21.98	0.99	2.11
1963	2.02	0.91	1.37	0.23	22.51	1.01	2.15
1964	2.01	0.95	1.41	0.24	23.08	1.04	2.23
1965	2.21	0.99	1.42	0.24	23.07	1.04	2.27
1966	2.26	1.02	1.40	0.24	23.52	1.06	2.32
1967	2.34	1.05	1.46	0.25	23.81	1.07	2.37
1968	2.44	1.10	1.51	0.26	24.33	1.09	2.45
1969	2.51	1.13	1.62	0.26	24.90	1.12	2.51

Table 1. Apparent Consumption of Alcoholic Beverages, in U.S. Gallons per Capita, of the Drinking-Age Population,[1] U.S.A., 1850-1978

Year	Distilled Spirits		Wine		Beer		Total
	Beverage Volume	Ethanol Volume	Beverage Volume	Ethanol Volume	Beverage Volume	Ethanol Volume	
14 years+							
1970	2.48	1.12	1.71	0.27	25.23	1.14	2.53
1971	2.50	1.13	1.93	0.31	25.63	1.15	2.59
1972	2.52	1.08	2.10	0.30	25.90	1.17	2.55
1973	2.57	1.11	2.14	0.31	26.77	1.20	2.62
1974	2.59	1.10	2.13	0.31	27.76	1.25	2.66
1975	2.58	1.11	2.22	0.32	28.09	1.26	2.69
1976	2.56	1.10	2.24	0.32	28.09	1.26	2.68
1977	2.56	1.05	2.37	0.31	29.05	1.31	2.67
1978	2.60	1.07	2.51	0.32	29.78	1.34	2.73

SOURCES: Data for 1950-1969: updated from Keller and Gurioli (1976).
Data for 1970-1978: calculated using data from Distilled Spirits Council of the United States, Inc. (1978*a*, 1978*b*); U.S. Department of Commerce (1980); U.S. Brewers Association (1979); Wine Institute (1977-78).

Note: For 1970 through 1978 data, the following percentages were used to compute ethanol:

Spirits: 1970-71 45.0% (A&H3)[2];
1972-76 43.0% (A&H3);
1977-78 41.1% (SAPIS)[2]
Wine: 1970-71 16.0% (A&H3);
1972-76 14.5% (A&H3);
1977-78 12.9% (SAPIS)
Beer: 4.5% (A&H3)

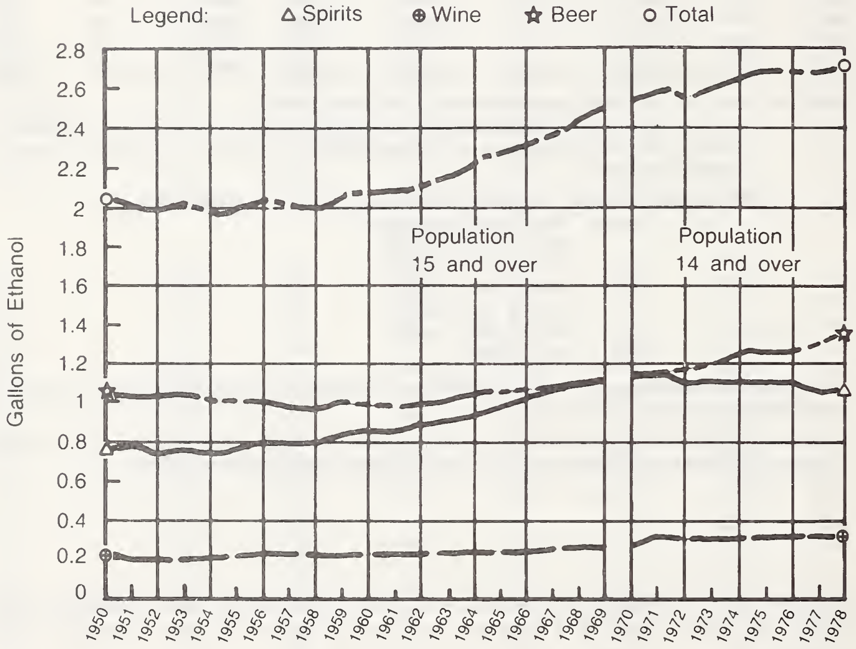
[1] Data through 1969 are based on a drinking-age population of 15 years and over; data beginning with 1970 are based on a drinking-age population of 14 years and over.

[2] A&H3 refers to the *Third Special Report to the U.S. Congress on Alcohol and Health* (Department of Health, Education, and Welfare 1978). SAPIS refers to the State Alcoholism Program Information System.

decade, a 25 percent increase. The rise continued more slowly in the 1970s to more than 2.7 gallons per adult by 1978, an increase of 8 percent.

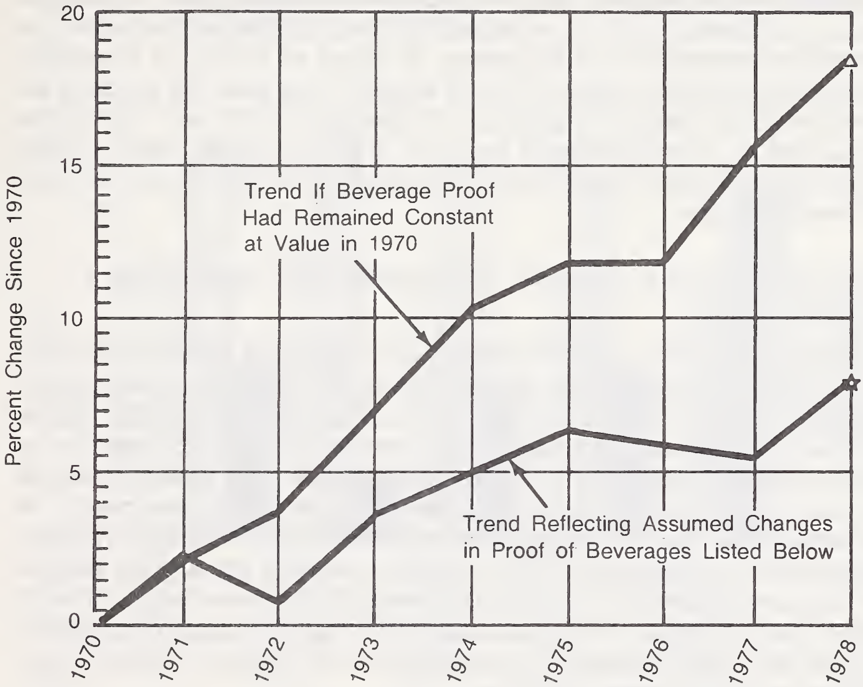
The reduced rise in apparent alcohol consumption in the 1970s may have been due largely to a trend toward lowered proof of alcoholic beverages. However, the average alcohol content of beverages in the United States and in specific States, and the trend of that content over time, are difficult data to obtain. Values used herein are approximate and were derived from several sources (Efron et al. 1974; Keller and Gurioli 1976; U.S. Department of Health, Education, and Welfare 1978*a*, 1980*a*). They are shown on figure 3. The upper curve on this figure shows the increase (19 percent) since 1970 that would have occurred in adult per capita consumption if the alcohol content of beverages had remained constant during the 1970s. The lower curve shows what is considered to be a more accurate estimate (8 percent rise in adult per

Figure 2. Apparent U.S. Consumption per Year of Alcoholic Beverages in Gallons of Ethanol Per Capita of the Drinking-Age Population, 1950-1978



SOURCE: DISCUS 1978; Efron et al. 1974; Keller and Gurioli 1976; U.S. Brewers Association, Inc. 1978; U.S. Department of Health, Education, and Welfare, 1978*a*, 1980*a*; Wine Institute (monthly data).

Figure 3. Proportionate Changes in Apparent Per Capita Consumption[1] of Ethanol, U.S.A., 1970-1978



[1] Drinking-age population: 14 years and older

[2] The following percentages were used to compute ethanol in the lower curve:
Spirits: 1970-71 45.0 percent (A&H3)[3]; 1972-76 43.0 percent (A&H3); 1977-78 41.1 percent (SAPIS)[3]
Wine: 1970-71 16.0 percent (A&H3); 1972-76 14.5 percent (A&H3); 1977-78 12.9 percent (SAPIS)
Beer: 4.5 percent (A&H3)

[3] A&H3 refers to the Third Alcohol and Health Report; SAPIS refers to the State Alcoholism Program Information System.

capita consumption in the 1970s) based on the lowered alcohol content in the 1970s.

Nationally, apparent consumption now averages about 1 ounce of ethanol (approximately two drinks) each day for each person 14 years old or older. Since about 35 percent of this population say they abstain, those who do drink consume a daily average of 1-1/2 ounces of ethanol (three drinks) when calculated on a daily basis. Such averages are misleading, however, since a small proportion of adults drink far more than average, while the great majority drink less (see figures 6 and 7). Approximately 11 percent, or more than 16 million adults 18 years and older, consume about half of all beverage alcohol sold. It can be anticipated that persons who are included in these upper percentiles are at substantial risk of experiencing alcohol-related problems as described elsewhere in this chapter. In terms of choice of beverage, Americans consume nearly as much ethanol from beer (49 percent) as from wine (12 percent) and liquor (39 percent) combined. Per capita consumption, when averaged over the U.S. population aged 14 and older, equals nearly 30 gallons (or the equivalent of 320 12-ounce cans) of beer each year.

Regional Patterns in Apparent Consumption and Self-Reported Drinking

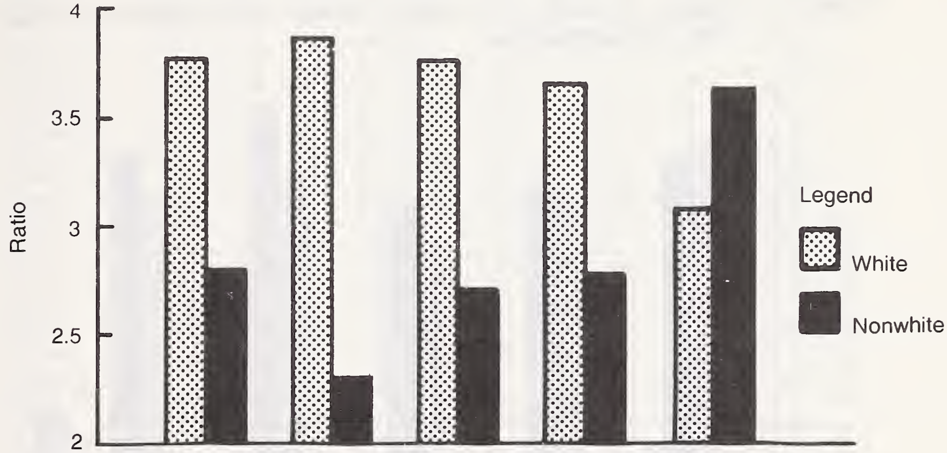
During the 1970s, regional differences in apparent alcohol consumption appeared to be shifting. Overall, the rate of apparent consumption rose in all regions except the Northeast, which declined slightly. Figure 4 shows the apparent per capita consumption for four U.S. regions, as well as the self-reported per capita consumption from several national surveys. The Southern region's apparent consumption was nearly 14 percent below the U.S. average in 1970, while the Northeast had the highest with an average of 0.99 ounces of ethanol per day per person 14 years and older. By 1978 the South was still the lowest region though only 8 percent below the U.S. average. The Western region showed the highest per capita apparent consumption, 1.06 ounces of ethanol per day per person 14 years and older.

Estimates of consumption from three large national health surveys based on probability samples of the noninstitutionalized civilian population are also shown on figure 4. The Health and Nutrition Examination Survey (HANES I) was carried out between 1971 and 1975 (U.S. Department of Health, Education, and Welfare n.d. *b*) on a sample of 17,714 persons aged 15 through 74. The 1977 national Health Interview Survey (HIS) (U.S. Department of Health, Education, and Welfare n.d. *c*) collected data on drinking and health habits from 22,842 people aged 20 and older. A series of NIAAA-sponsored surveys by Harris and ORC (Johnson et al. 1977) collected data between 1971 and 1975.

While the regional patterns of self-reported consumption from these surveys appear similar to apparent consumption based on sales and taxation data, they account for only 25 to 50 percent of the alcoholic beverages sold. The 1977 HIS reflects the higher consumption in the West, but the South remains strikingly low. Among the numerous possible reasons for the apparent underreporting in surveys are: (1) the surveys may not have included a representative sample of the heavier drinkers, and (2) survey respondents might have seriously underreported their actual consumption.

Variations in reported consumption of men and women are shown in figure 5. Within each region, males of all ages reported significantly higher consumption than females. White males reported consumption levels between three and four times those for white females. Nonwhite males reported drinking more than nonwhite females at ratios ranging from 2.3 in the Northeast to 3.7 in the West.

Figure 4. Estimated Mean Daily Alcohol Consumption Based on Sales and Surveys

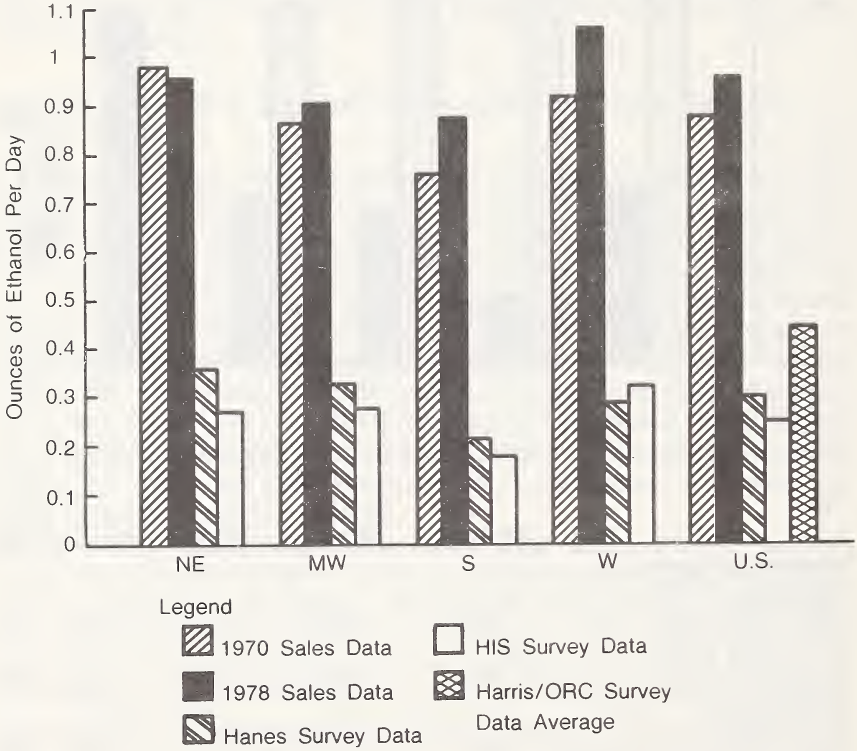


Type	Region				
	Northeast	Midwest	South	West	All Regions
Apparent per Capita Consumption 1970					
From Sales 1970 (14 yrs and older)	0.98	0.87	0.76	0.92	0.89
From Sales 1978	0.96	0.91	0.88	1.06	0.95
Self-Reported Consumption (15-74 yrs) (1971-75 Hanes)	0.36	0.33	0.22	0.29	0.30
Self-Reported Consumption (20 yrs and older) From HIS	0.27	0.28	0.18	0.33	0.25

Patterns in State Apparent Consumption

As noted in table 2, the range has narrowed between States in the levels of consumption as measured by sales per person 14 years and older during the decade of the 1970s. Per capita apparent consumption increased or remained constant in all but five States: (Alaska, Connecticut, Delaware, New Jersey, and New York) and the District of Columbia. Nevada has now surpassed Washington, D.C., as the jurisdiction with the highest apparent per capita consumption in the Nation. Most Southern States showed large increases in apparent per capita consumption although they are still lower than States in other regions.

Figure 5. Ratio of Male to Female Mean Self-Reported Alcohol Consumption



	All Regions	Northeast	Midwest	South	West
Total	.30	.36	.33	.22	.29
Male	.48	.58	.52	.35	.46
Female	.13	.16	.14	.10	.14
White	.31	.36	.33	.23	.30
Nonwhite	.24	.34	.28	.16	.25

SOURCE: NCHS, HANES I, 1971-1975 Medical History (12-74 yrs.).

Table 2. Apparent U.S. Consumption of Alcoholic Beverages in Gallons of Ethanol Per Capita of the Drinking Age Population[1,2]

State	Spirits		Distilled Wine		Beer		Total Ethanol		Rank	Percent Change in Total Ethanol from
	1970	1978	1970	1978	1970	1978	1970	1978	1978	1970 to 1978
Alabama	0.70	0.87	0.09	0.12	0.60	0.98	1.39	1.97	46	42
Alaska	2.07	1.71	0.37	0.46	1.18	1.42	3.62	3.59	4	-1
Arizona	1.05	1.14	0.32	0.39	1.37	1.78	2.74	3.31	10	21
Arkansas	0.59	0.72	0.13	0.11	0.71	0.97	1.43	1.80	50	26
California	1.37	1.32	0.63	0.68	1.10	1.42	3.10	3.42	6	10
Colorado	1.26	1.44	0.31	0.47	1.18	1.50	2.75	3.41	7	24
Connecticut	1.46	1.20	0.34	0.38	1.00	1.08	2.80	2.66	30	-5
Delaware	1.74	1.36	0.21	0.23	1.17	1.34	3.12	2.93	19	-6
District of Columbia	4.44	3.09	0.82	0.95	1.39	1.43	6.65	5.47	2	-18
Florida	1.52	1.43	0.30	0.34	1.09	1.52	2.91	3.29	11	13
Georgia	1.02	1.15	0.14	0.18	0.79	1.12	1.95	2.45	34	26
Hawaii	1.13	1.31	0.25	0.47	1.11	1.39	2.49	3.17	12	27
Idaho	0.75	0.83	0.10	0.28	1.20	1.51	2.05	2.62	31	28
Illinois	1.34	1.18	0.27	0.31	1.21	1.38	2.82	2.87	20	2
Indiana	0.69	0.77	0.12	0.16	1.00	1.20	1.81	2.13	44	18
Iowa	0.68	0.74	0.06	0.11	1.09	1.52	1.83	2.37	36	30
Kansas	0.65	0.66	0.09	0.11	0.85	1.14	1.59	1.91	47	20
Kentucky	0.84	0.77	0.08	0.09	0.93	0.99	1.85	1.85	48	0
Louisiana	0.91	1.07	0.29	0.25	1.20	1.35	2.40	2.67	28	11
Maine	1.03	1.09	0.10	0.27	1.24	1.31	2.37	2.67	28	13
Maryland	1.39	1.37	0.25	0.31	1.31	1.37	2.95	3.05	15	3
Massachusetts	1.35	1.25	0.30	0.40	1.15	1.39	2.80	3.04	16	9
Michigan	1.07	1.05	0.24	0.27	1.37	1.43	2.68	2.75	23	3
Minnesota	1.23	1.16	0.16	0.23	1.14	1.31	2.53	2.70	26	7
Mississippi	0.71	0.92	0.08	0.10	0.82	1.16	1.61	2.18	42	35
Missouri	1.00	0.80	0.20	0.20	1.12	1.32	2.32	2.32	38	0
Montana	1.03	1.09	0.13	0.20	1.54	1.83	2.70	3.12	14	16
Nebraska	1.01	0.90	0.13	0.18	1.28	1.50	2.42	2.58	33	7
Nevada	3.18	3.69	0.67	0.85	1.73	2.24	5.58	6.78	1	22
New Hampshire	2.83	2.93	0.32	0.54	1.68	1.98	4.83	5.45	3	13
New Jersey	1.38	1.10	0.38	0.42	1.17	1.17	2.93	2.69	27	-8
New Mexico	0.98	0.98	0.36	0.32	1.20	1.65	2.54	2.95	18	16
New York	1.43	1.15	0.40	0.42	1.17	1.18	3.00	2.75	23	-8
North Carolina	0.91	0.86	0.16	0.21	0.72	1.09	1.79	2.16	43	21
North Dakota	1.02	1.15	0.11	0.16	1.21	1.41	2.34	2.72	25	16
Ohio	0.81	0.73	0.19	0.20	1.22	1.30	2.22	2.23	40	0
Oklahoma	0.84	0.83	0.15	0.14	0.78	1.08	1.77	2.05	45	16
Oregon	0.90	0.98	0.39	0.47	1.17	1.35	2.46	2.80	21	14
Pennsylvania	0.82	0.74	0.19	0.21	1.26	1.36	2.27	2.31	39	2
Rhode Island	1.17	1.15	0.38	0.49	1.28	1.53	2.83	3.17	12	12
South Carolina	1.08	1.20	0.16	0.17	0.80	1.23	2.04	2.60	32	27
South Dakota	0.90	1.05	0.13	0.17	0.93	1.20	1.96	2.42	35	23
Tennessee	0.59	0.80	0.06	0.12	0.87	1.27	1.52	2.19	41	44
Texas	0.74	0.85	0.17	0.20	1.31	1.71	2.22	2.76	22	24
Utah	0.57	0.62	0.12	0.14	0.75	0.97	1.44	1.73	51	20
Vermont	1.73	1.59	0.39	0.47	1.38	1.51	3.50	3.57	5	2
Virginia	1.02	0.91	0.20	0.21	1.11	1.22	2.33	2.34	37	0
Washington	1.08	1.14	0.39	0.48	1.19	1.39	2.66	3.01	17	13
West Virginia	0.69	0.79	0.09	0.09	0.87	0.96	1.65	1.84	49	12
Wisconsin	1.25	1.26	0.22	0.28	1.71	1.80	3.18	3.34	9	5
Wyoming	1.15	1.36	0.16	0.22	1.28	1.53	2.59	3.41	7	32
Total U.S.	1.12	1.07	0.27	0.32	1.14	1.34	2.53	2.73	-	8

[1] Drinking age population is assumed to be 14 years and older. Ethanol = 4.5 percent (A&H3) for beer; 16 percent (A&H3) for wine in 1970; 12.9 percent (SAPIS) for wine in 1978; 45 percent (A&H3) for spirits in 1970; 41.1 percent (SAPIS) for spirits in 1978.

[2] For comparative purposes only, amounts are calculated according to "tax paid withdrawals" and do not show illegally produced alcohol that is consumed or certain other sales, such as military sales.

Increases of more than 20 percent were also seen in half of the Western States. The greatest increases were shown in: Tennessee (44 percent), Alabama (42 percent), Mississippi (35 percent), Wyoming (32 percent), Iowa (30 percent), Idaho (28 percent), Hawaii (27 percent), South Carolina (27 percent), Arkansas (26 percent), and Georgia (26 percent).

It should be noted that when per capita estimates of consumption based on sales data are made for certain States, a major source of error lies with the choice of attributable population base. Certain States have extremely transient populations. In the case of Nevada, the phenomenon is associated with tourism. The States of New Hampshire and Vermont, and the District of Columbia, having access to larger metropolitan populations nearby, and having the lowest levels of liquor tax, attract substantial customers from outside their borders. No accurate estimates for such transient trade are available, and only resident population estimates are available for computing apparent per capita consumption. Thus, some values are inflated and do not necessarily reflect apparent per capita consumption of the resident population.

Beer apparent per capita consumption increased or remained at the same level in every State. By 1978 only seven States (Alaska, Connecticut, Delaware, Georgia, Nevada, New Hampshire, and Vermont) and the District of Columbia had a per capita alcohol intake from liquor exceeding that from beer. In many States, apparent per capita beer consumption rose more than 30 percent; and in Alabama, apparent per capita beer consumption rose by over 60 percent.

Wine apparent per capita consumption likewise increased in most States, and increased 19 percent for the Nation as a whole. In 21 States, apparent per capita wine consumption rose more than 25 percent. In only 4 States (Arkansas, Louisiana, New Mexico, and Oklahoma) did apparent consumption decrease, even though the percentage of alcohol in wine decreased by 19 percent during these years (U.S. Department of Health, Education, and Welfare 1980*a*).

Liquor apparent per capita alcohol consumption decreased overall in the United States by 4 percent, even though it rose in 27 States. Again, this decrease may be partially attributed to the lowered proof of alcoholic beverages—a phenomenon of the decade.

U.S. Self-Reported Drinking From Surveys

Levels of self-reported drinking based on several surveys are shown in table 3 (Munch et al. 1980). The differences between surveys in the proportions of abstainers are attributed to differences in the survey questions and to incomplete responses by the very infrequent drinkers. Those in the category labeled "incomplete data" indicated that they drank at least occasionally but did not complete all survey questions. This group is considered to be composed primarily of those who drink infrequently. If data for this group were included with the abstainer category, the proportions in each category would be roughly comparable in the three survey sets.

Table 3. Categories of Self-Reported Drinking (in Percentages)

	HANES I 1971-1975	HIS 1977	Harris/ORC 5-Year Average 1971-1975
Males			
Abstainer[1]	17.9	18.1	27
Incomplete Data[2]	10.0	15.4	–
Lighter[3]	33.8	26.5	28
Moderate[4]	21.9	28.5	27
Heavier[5]	16.4	11.0	18
All Males	100.0	100.0	100.0
(*N*)	7,095	10,634	4,707
Females			
Abstainer	29.2	32.6	43
Incomplete Data	17.6	5.8	–
Lighter	39.6	42.6	37
Moderate	10.2	16.8	16
Heavier	3.4	2.2	4
All Females	100.0	100.0	100.0
(*N*)	10,619	12,208	4,867
Total			
Abstainer	23.8	25.5	35
Incomplete Data	14.6	10.0	–
Lighter	36.8	34.3	32
Moderate	15.8	21.8	22
Heavier	9.6	6.2	11
All	100.0	100.0	100.0
(*N*)	17,714	22,842	9,574

[1] Abstainer–person who reports drinking less than one alcoholic beverage a year in the HANES, or less than one a month in the Harris/ORC survey, or who gives a response of never to consumption of beer, wine, or liquor in the HIS survey.

[2] Incomplete Data–refers to person who answers either the quantity question or the frequency question but not both.

[3] Lighter–person who reports drinking .01 to .22 oz of ethanol per day.

[4] Moderate–person who reports drinking .22 to .99 oz of ethanol per day.

[5] Heavier–person who reports drinking 1 oz or more of ethanol per day.

From 11 to 18 percent of the men and from 2 to 4 percent of the women (table 3) reported drinking at least 1 or more ounces of ethanol per day. The average self-reported consumption for both men and women combined in this category ranged from 6 to 11 percent.

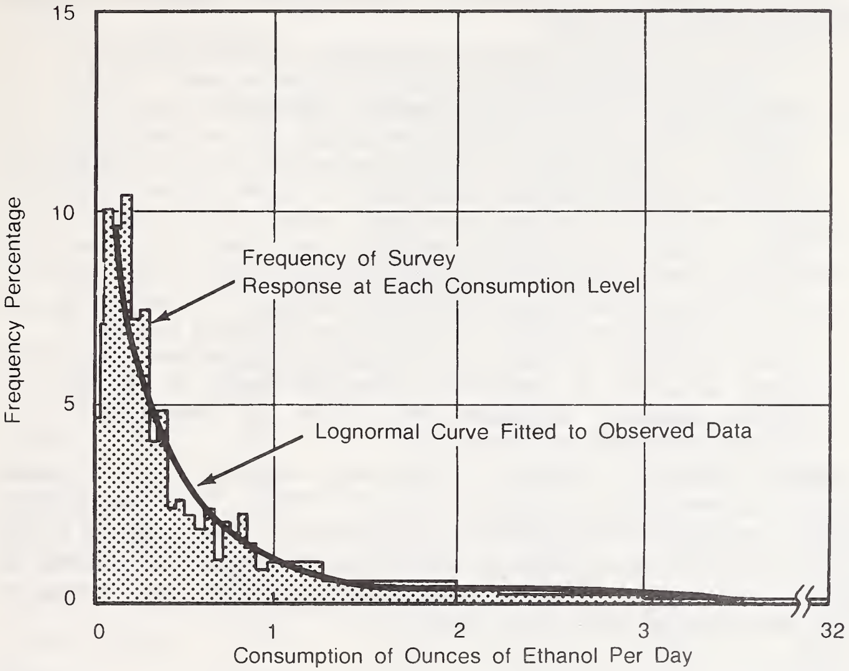
A typical pattern of the lower end of the distribution of self-reported consumption is shown in figure 6 (U.S. Department of Health, Education, and Welfare 1973), together with a lognormal curve fitted to these data. This distribution is highly skewed, extending to self-reported consumption levels of more than 30 ounces a day (60 drinks) but with very few individuals at the highest consumption levels.

Since a large proportion of alcohol is consumed by the very few heaviest drinkers, it is important to obtain accurate information about this group; however, this is precisely the group which is difficult to survey well. In addition, the large group who drink infrequently are difficult to classify in that they often do not answer some survey questions. This latter group is important in determining the proportion of adults who abstain, and hence in determining the proportion of drinkers when making comparisons of drinking populations.

Figure 7 shows the relationship between cumulative alcohol consumption and cumulative drinker populations ranked from the lowest to the highest drinkers for observed data on two surveys and for a lognormal curve fit through these data. The appropriateness of the lognormal curve to represent the actual drinking distribution has been reviewed by numerous authors (deLint and Schmidt 1971; Ledermann 1956; *The Ledermann Curve* 1977; Parker and Harman 1980), frequently in connection with alcohol control policy considerations. The inclusion of lognormal curves in this chapter is not intended as an endorsement of either side of this argument. Rather, it provides a simple illustration of an approach to the reconciliation of survey and sales data.

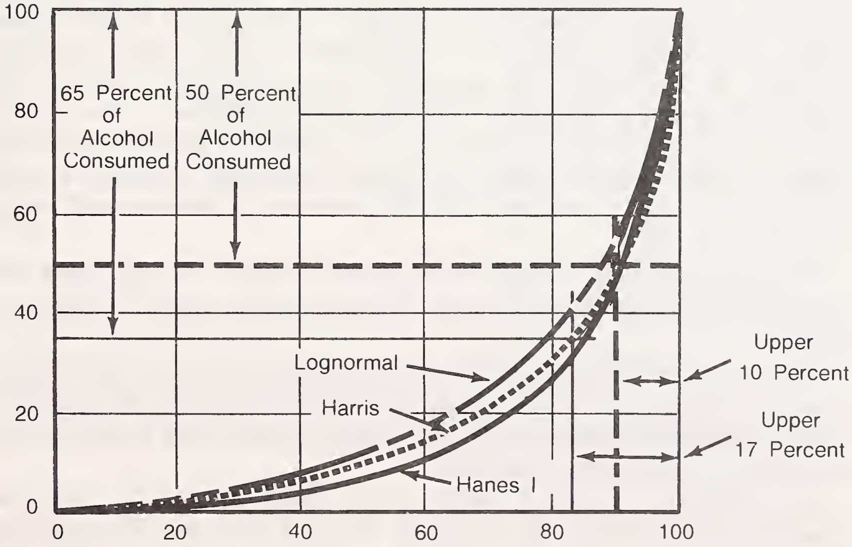
As can be seen on figure 7, the self-reported ethanol consumption of the upper 10 percent of the drinkers accounts for about half of all self-reported ethanol consumption in this country. Assuming that 35 percent of all adults are abstainers, this heavier drinking group is 6-1/2 percent of all adults. Similarly, the upper 17 percent of the drinkers (11 percent of all adults) accounts for about 65 percent of all alcohol self-reported consumption. If these self-reported proportions are representative of actual consumption, then this upper decile of the drinkers (6-1/2 percent of the total adult population) consumes half of the alcohol sold and the upper 11 percent of the total adult population consumes 65 percent of all alcohol sold. Since the U.S. average sales are now nearly 1 ounce a day per adult, this means that the upper 6-1/2 percent of all adults must average nearly 8 ounces of ethanol a day (nearly 16 drinks), although they report about half that in surveys. The upper 11 percent (those classified as heavier drinkers in the Harris/ORC surveys and

Figure 6. Frequency Distribution of Consumption for a National Sample of Alcohol Users



SOURCE: Four pooled surveys from Louis Harris and Associates, 1972-1974.

Figure 7. Typical Distribution of Alcohol Consumption, U.S.A., Drinkers Only, Aggregated From Several National Surveys, 1971-1975



SOURCE: Hanes I: NCHS, 1971-1975 Medical History Questionnaire (Ages 15-74) (Standardized Microdata Tape Transcript) reporting 1 ounce of ethanol or more a day) probably consume 2 or more ounces of ethanol a day.

To better illustrate this consumption distribution, consider a group of 100 typical American adults.

> In this group, 35 say they are "abstainers" although about 11 of these may have one or more drinks a year. Of the remaining 65, 54 say they average less than 1 ounce of ethanol a day (less than two drinks a day), five say they drink between 1 and 2 ounces a day (between two and four drinks a day), and about six say they drink 4 or more ounces a day (eight or more drinks a day). Their actual consumption is about twice that reported, however, and the 6 heaviest drinkers are probably averaging 16 drinks a day. About half of the total alcohol consumed by the group of 100 adults is drunk by these individuals. The 5 heavier drinkers and the 6 heaviest drinkers (11 out of 100 adults) are considered to be those who are at significantly elevated levels of risk for health problems, accidents, and crime, as described in subsequent sections of this report.

Overall, there do not appear to have been significant trends in self-reported consumption by adults during the 1970s. There were differences in youthful drinking trends, as described in other chapters of this report, but the most significant differences in patterns of drinking by adults were between populations with differing demographic characteristics, as described in the next section.

Demographic Characteristics of Self-Reported Alcohol Use

Tables 4 and 5 and figure 8 show beverage preference and category of drinking by self-reported country of national origin, race, sex, and age. The beverage preferences of adults in the United States do not match expectations based on consumption in the native countries (Cahalan et al. 1969). For example, those of Italian, French, and Spanish descent prefer beer, the drink most preferred in the United States, rather than wine, which is the overwhelming preference in their native countries. Nearly half of the males listed beer as their preferred alcoholic beverage, contrasted with 46.2 percent of the female drinkers, who preferred liquor.

The largest proportions of heavier drinkers were among those who reported their national origins as Spanish, Polish, Irish, German, or English.

Table 6 is a cross-tabulation of beverage preference and marital status. Preferences for beer were indicated by males in all categories and by females who were separated. Liquor preferences were indicated by women in most other categories.

As evident in figure 8, beer is the most frequently consumed beverage for all persons up to age 50. Persons older than 50 expressed a greater preference for liquor, with beer the second preference. The

Table 4. Levels of Self-Reported Drinking by Ethnicity, Race, and Sex

	Drinking Category Percentages				
	Abstainer[1]	Lighter	Moderate	Heavier	Sample Size[2]
Ethnicity					
German	32.2	40.5	16.2	10.4	2,987
Irish	40.1	33.4	15.3	11.0	2,322
Italian	24.1	45.9	21.1	8.0	595
French	33.8	40.3	16.0	9.8	922
Polish	22.8	41.6	21.9	13.0	464
Russian	29.5	45.9	18.6	5.9	169
English	37.7	35.7	16.1	10.11	2,312
Spanish	45.2	27.8	11.4	14.7	304
Mexican	42.7	32.1	14.8	9.4	442
Chinese	24.3	72.5	3.2	0	43
Japanese	49.6	36.6	5.6	8.2	39
American Indian	51.9	30.5	11.2	5.8	255
Negro	44.2	33.5	14.6	6.4	2,898
Jewish	31.8	42.2	24.1	1.9	53
Other	41.5	34.6	14.3	9.1	3,914
Race					
White	36.8	36.9	15.8	10.0	14,609
Black	44.2	33.5	14.6	6.4	2,893
Other	39.6	42.0	13.7	4.5	212
Sex					
Male	27.7	33.6	21.7	16.3	7,095
Female	46.6	39.4	10.2	3.4	10,519
Total	37.8	36.8	16.0	9.6	17,714

SOURCE: NCHS, HANES I, 1971-1975 Medical History, 12-74 years.

[1] Respondents who drink but did not complete frequency or quantity questions were grouped with abstainers in this table.

[2] 17,714 responses weighted to represent 141 million U.S. adults aged 15-74.

Table 5. Self-Reported U.S. Alcohol Beverage Preference for Drinkers by Ethnicity, Race, and Sex[1]

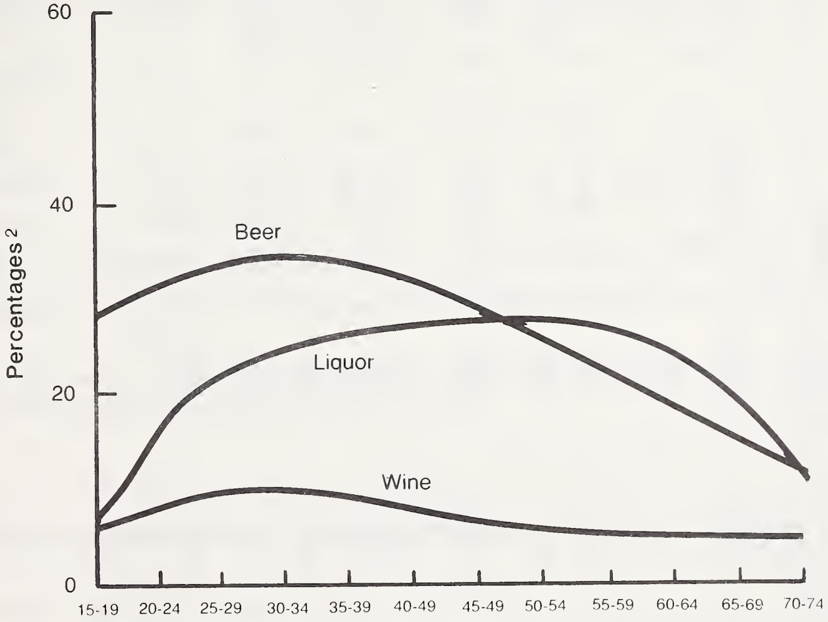
	Percentages			
	Beer	Wine	Liquor	Sample Size[2]
Ethnicity				
German	45.4	16.4	37.5	1,910
Irish	45.9	14.4	39.5	1,281
Italian	37.7	27.7	34.7	431
French	44.0	17.1	38.2	561
Polish	47.6	12.2	39.7	345
Russian	21.6	38.2	40.0	117
English	40.7	16.7	41.8	1,348
Spanish	53.1	20.4	25.4	157
Mexican	64.1	10.6	25.2	232
Chinese	51.4	4.6	44.0	23
Japanese	30.6	21.6	47.8	19
American Indian	61.5	4.9	33.0	112
Negro	55.4	10.0	34.5	1,456
Jewish	27.1	17.9	55.0	34
Other	46.0	15.0	38.2	2,084
Race				
White	44.7	16.4	38.3	8,543
Black	54.5	9.4	33.9	1,456
Other	51.2	13.5	35.0	111
Sex				
Male	59.2	8.9	31.1	4,761
Female	28.9	24.4	46.2	5,349
Total	46.0	15.9	38.1	10,110

SOURCE:NCHS, HANES I, 1971-1975 Medical History, 12-74 years.

[1] Respondents who did not indicate a preference are not included in this table.

[2] 10,110 Drinkers weighted to represent 86 million adult drinkers aged 15-74.

Figure 8. Self-Reported Beverage Preference by Age (Percentage, weighted)[1,2]



SOURCE: NCHS Hanes I, 1971-1975, Medical History, 12-74 yrs.

[1] 17,714 responses weighted to represent 141 million adults (ages 15-74).

[2] Remaining percentages not shown on the chart are nondrinkers or those persons without a beverage preference.

popularity of beer among younger adults may explain in part the high beverage sales of beer, since such a large percentage of adults are under 50 years of age. Wine remains the least preferred of all three types of beverage for all ages.

Table 7 shows drinking categories versus usual activity. The largest proportions of heavier drinkers are among those who are currently working, attending school, or in a category of "other." Those in the "keeping house" and "retired" categories show lower proportions of heavier drinkers.

Table 6. Self-Reported Preference for All Persons in Each Marital Category

	Percentage by Marital Status							
Preference	Under 17	Married	Widowed	Never Married	Divorced	Separated	Unknown	Total
Males								
Beer	9.6	42.2	37.7	52.1	39.5	44.6	41.0	39.3
Wine	2.0	6.2	3.1	7.5	4.1	4.8	7.3	5.7
Liquor	0.9	27.0	32.5	12.2	36.0	20.6	0	20.9
Nondrinker or no preference	87.4	24.3	25.7	28.3	20.4	29.9	51.7	34.2
(N)[1]	(347)	(5,022)	(236)	(1,120)	(539)	(139)	(8)	(7,095)
Females								
Beer	4.3	15.7	7.1	19.5	19.0	30.0	35.1	14.6
Wine	4.6	12.0	6.9	17.5	11.0	9.3	0	11.2
Liquor	1.7	27.2	22.8	20.8	31.4	25.4	37.6	22.7
Nondrinker or no preference	89.4	45.1	63.1	42.2	38.7	35.3	27.2	51.5
(N)	(340)	(6,716)	(1,257)	(1,355)	(539)	(405)	(7)	(10,619)

SOURCE: NCHS, HANES I, 1971-1975 Medical History, 12-74 years.

[1] 17,714 responses weighted to represent 141 million U.S. adults aged 15-74.

Table 7. Self-Reported Consumption for All Persons Age 20 and Above by Categories of Usual Activity

	Percentage by Usual Activity						
Drinking Category	Working	Keeping House	Attending School	Retired (Health)	Retired (Other)	Unknown Other	Total
Abstainer	18.2	39.9	16.0	43.2	34.7	29.6	26.0
Incomplete Data	12.9	3.9	12.4	10.6	8.2	17.8	10.3
Lighter	33.2	40.9	33.4	27.6	23.0	24.3	35.1
Moderate	26.9	13.7	29.5	12.2	19.0	19.7	22.3
Heavier	8.5	1.6	8.7	6.3	5.1	8.1	6.2
(N)[1]	(12,894)	(6,201)	(688)	(603)	(1,152)	(804)	(22,342)

SOURCE: NCHS, HIS Health Habits Supplement (ages 20 and above), 1977.

[1] 22,842 responses weighted to represent 140 million U.S. adults age 18+ (500 additional missing cases not included in table).

Alcohol-Implicated Consequences

Medical Consequences

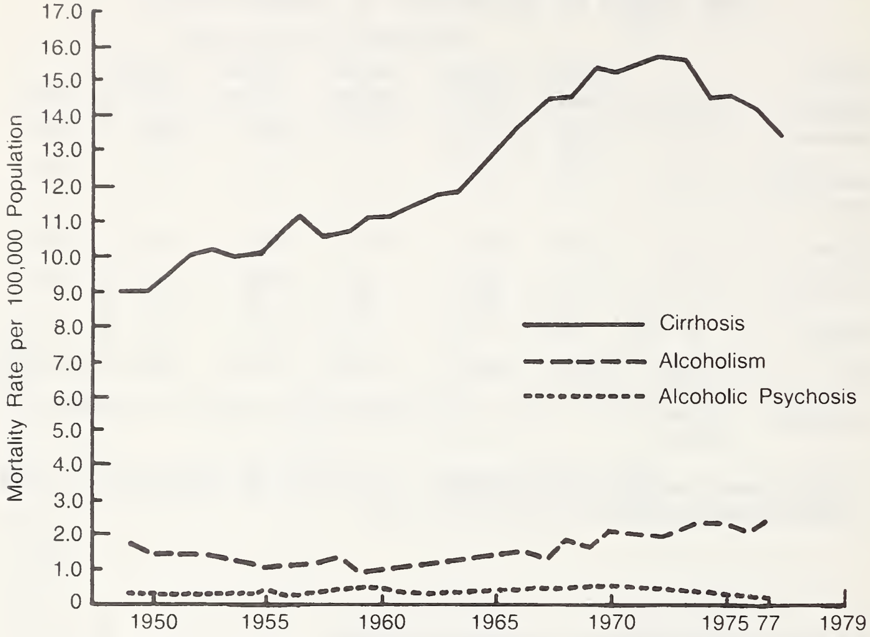
Alcohol consumption, particularly the inappropriate or excessive use of alcohol, can be associated with a number of acute and chronic medical problems leading to significant morbidity and mortality.

Mortality

Mortality Due to Cirrhosis, Alcoholism, and Alcoholic Psychosis. Figure 9 shows the trends in mortality for three medical conditions highly related to chronic alcohol abuse, namely, deaths due to cirrhosis of the liver, alcoholism, and alcoholic psychosis. Particular attention is given to liver cirrhosis since it is the seventh leading cause of death in the United States, and because most cirrhosis is generally attributed to heavy, prolonged alcohol consumption. Approximately 40 percent of death certificates that list liver cirrhosis as the underlying cause of death also specifically mention alcohol. Many experts estimate that actual levels of association are nearer to 90 to 95 percent (U.S. Department of Health, Education, and Welfare 1978*a*).

Following a continuous rise since the end of Prohibition, cirrhosis death rates reached a peak age-adjusted rate of 15.0 deaths per 100,000 in 1973, after which the rates turned downward and have declined ever since. The comparable age-adjusted death rate in

Figure 9. Trends in Selected Mortality Rates in the United States, 1949-1978



SOURCE: U.S. Department of Health, Education, and Welfare. National Center for Health Statistics. Vital Statistics of the United States, Volume II - Mortality. Part A. Washington, D.C.: U.S. Government Printing Office, 1949-1978. (Annual Publication)

1977 was 13.1, a drop of 13 percent from 1973. This decline is particularly interesting in light of the continued rise in apparent alcohol consumption. This appears contrary to studies like that of Brenner (1975), in which he noted that trends in cirrhosis mortality tend to follow trends in estimated alcohol consumption by a relatively short period on the order of 1 to 2 years.

The decrease in alcohol-related death rates since 1973 has occurred during a period when the overall U.S. age-adjusted death rates declined by 6.4 percent. Death rates for most major causes of death have fallen during this time, but the proportionate decline in age-adjusted cirrhosis death rates has been greater than the overall decline since that time.

Reasons for this accelerated decline of cirrhosis mortality are not known, but may reflect improved care and treatment of individuals with alcohol-related problems, including cirrhosis. Another reason could be improved prevention programs, which reduce the populations at risk for developing cirrhosis, or lead to reduction in the types of drinking that result in excess mortality.

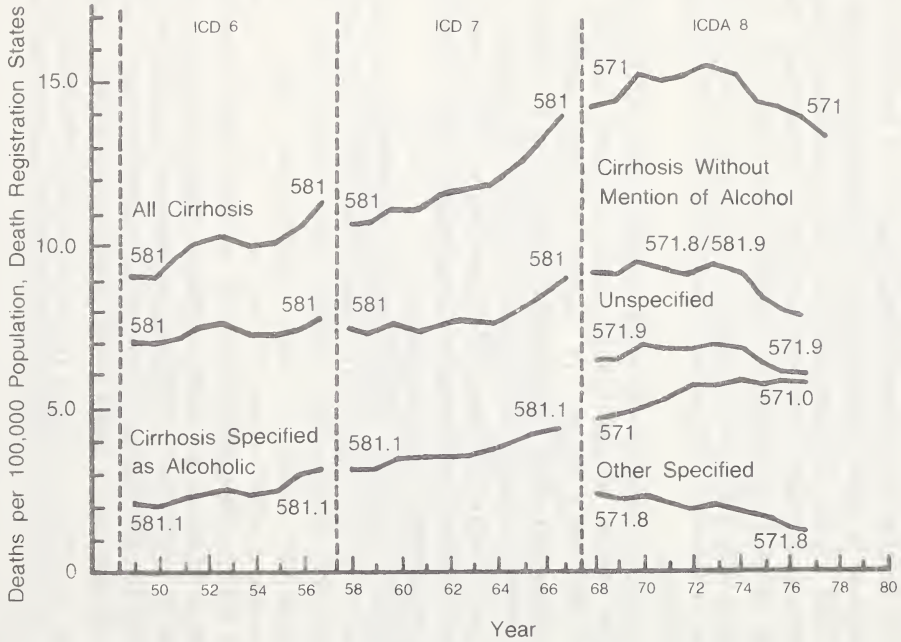
Figures 10 and 11 show some of the components of cirrhosis mortality and their trends in relation to overall cirrhosis mortality rates. Diagnostic codes noted are the three applicable International Classification of Diseases (ICD) schemes in use since 1949. Before 1968, cirrhosis deaths were classified either as specifically alcohol-related (581.1) or not specified (581.0). Both categories participated in the rising mortality trends during the 1950s and 1960s. The category of cirrhosis without mention of alcohol (581.0) was divided into two categories beginning in 1968: "other specified" (571.8) and "unspecified" (571.9). For illustrative purposes, categories 571.8 and 571.9 have also been combined to allow comparisons of the rates since 1968 with those before 1968. Figure 10 shows that the "other specified" category has been falling since 1968, and the category "unspecified" began clearly to fall by 1974. The category of cirrhosis with mention of alcohol continued to rise until 1976, and indeed it may be too early to know whether a clear reversal in the general upward trend for this category has actually occurred.

The most dramatic change in cirrhosis mortality since 1949 occurred among nonwhite males, whose mortality rate increased four-fold fold between 1949 and 1973 (figure 11). During the same period, rates among white males and white females also rose during the period, but not as sharply. Since the early 1970s, a drop in rates has occurred in all four groups. Even though cirrhosis mortality among nonwhite males has been falling since 1973, it still remains substantially higher than levels derived for the three other race-sex groups.

Excessive rates of cirrhosis mortality among nonwhites were particularly noted in some of the large urban areas of the Nation. For example, figure 12 shows the comparative cirrhosis death rates among white males and nonwhite males in seven metropolitan areas. These metropolitan areas contain about 30 percent of the U.S. nonwhite population, but account for about half of U.S. reported cirrhosis mortality among nonwhites (Malin et al. 1978). In these cities, cirrhosis mortality rates are higher at each age for nonwhite males as compared to white males and for nonwhite females as compared to white females. Overall, the cirrhosis mortality rate in these seven areas is 44 percent higher for nonwhites than for whites. Younger nonwhite males in these cities die from cirrhosis of the liver at rates up to 10 times those for comparable white male groups.

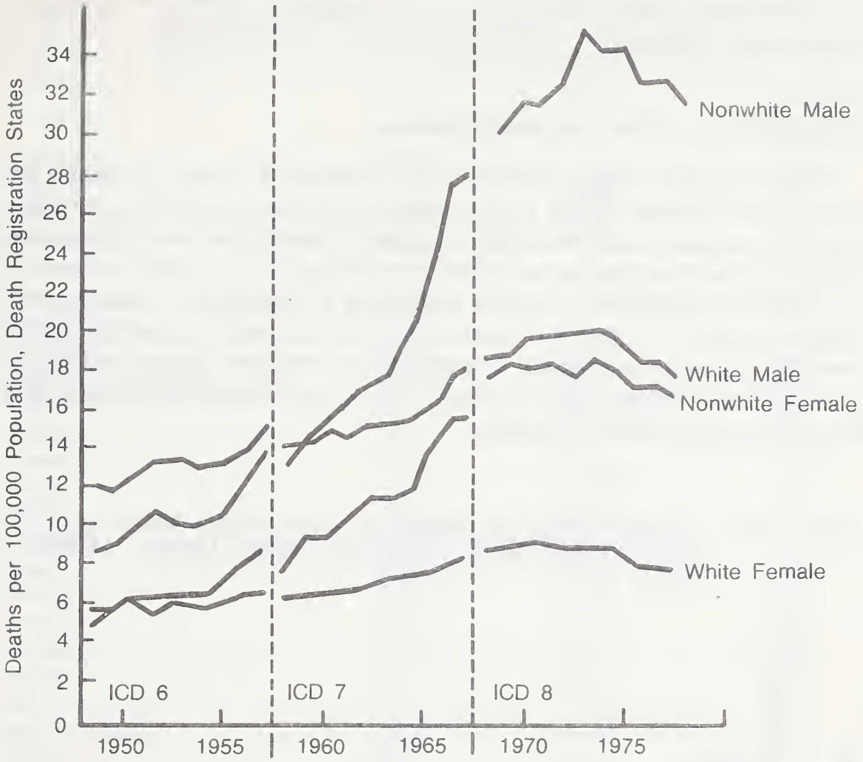
The national downward trend of cirrhosis mortality did not hold in all States, as noted in table 8 which shows the change between 1973 and 1976 for each of the 50 States and the District of Columbia. While cirrhosis mortality decreased in most States, increases were noted in 16 States, of which 7 (Alaska, Mississippi, Nevada, North Dakota, Oklahoma, South Dakota, and Wyoming) experienced increases greater than 10 percent. With the exception of Alaska, these States had increases

Figure 10. Cirrhosis Mortality Rates in the United States, 1949-1977 (With and Without Mention of Alcohol)



SOURCE: U.S. Department of Health, Education, and Welfare. National Center for Health Statistics. Vital Statistics of the United States, Volume II - Mortality. Part A. Washington, D.C.: U.S. Government Printing Office, 1949-1978. (Annual Publication)

Figure 11. Age-Adjusted Death Rates, Cirrhosis of Liver, by Color and Sex, 1949-1977



SOURCE: U.S. Department of Health, Education, and Welfare. National Center for Health Statistics. Vital Statistics of the United States, Volume II - Mortality. Part A. Washington, D.C.: U.S. Government Printing Office, 1949-1978. (Annual Publication)

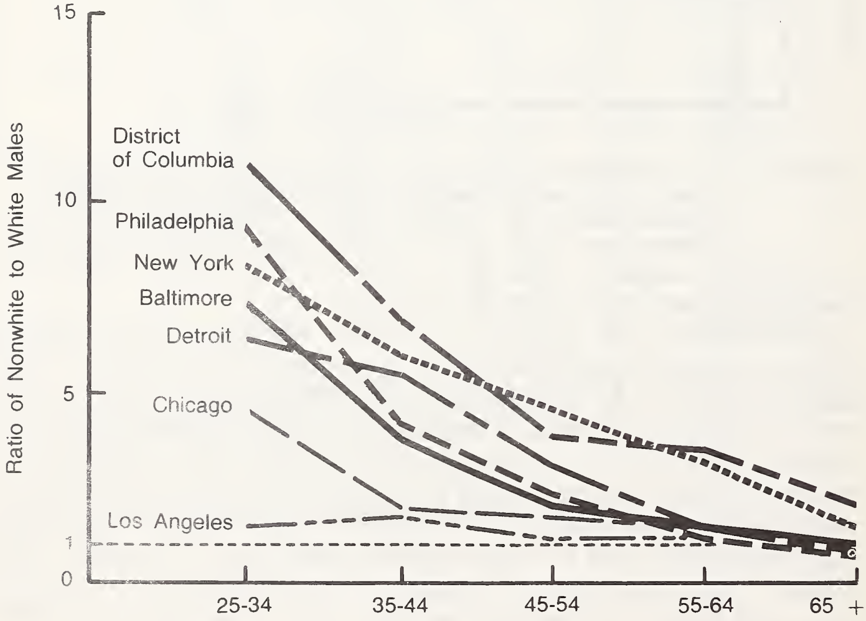
in apparent ethanol consumption from 16 to 35 percent above the average increase of 8 percent for the Nation.

Nevertheless, the number of cirrhosis deaths and the national cirrhosis mortality rates have fallen since 1973. The reason for this decline is unclear. As mentioned above, mortality due to most causes has fallen during this decade, indicating a general improvement in the survival experience for the Nation. However, the rate of decrease in cirrhosis mortality has exceeded the rate of decrease from all causes combined. Possible reasons for this decline in total cirrhosis rates were mentioned earlier, but no fully adequate explanation is available. The situation is complicated in relation to alcohol abuse inasmuch as the subcategory of cirrhosis mortality that specifically mentions alcohol involvement is the only category that has not clearly fallen since 1973. However, this may reflect differences in reporting practices rather than a significant trend in alcohol-related liver disease.

Mortality From Other Selected Causes

While mortality from cirrhosis is an important cause of death and serves as a marker (albeit a late one) for abusive alcohol consumption patterns, several other important causes of death are also significantly associated with alcohol use. While it is difficult to be precise about the proportion of deaths that can be attributed to these other causes, table 9 lists a number of selected causes of death for which a portion can be identified as alcohol-related. In addition to mortality directly related to alcohol, other deaths such as those from motor vehicle accidents, falls, fires, other accidents, homicides,

Figure 12. 3-Year Average Ratio of Non-White Male to White Male Liver Cirrhosis Death Rates, 1975-1977



SOURCE: U.S. Department of Health, Education and Welfare. National Center for Health Statistics. Standardized Microdata Tape Transcript. Vital Statistics Mortaltity, Detail, 1975-1977. Final data prepared by Alcohol Epidemiological Data System staff.

Table 8. Age-Adjusted Mortality Rates, Cirrhosis of the Liver (ICDA 571) in the United States, 1973 and 1976[1]

States	1973	1976	Percentage Change
Alabama	10.45	9.15	-12.4
Alaska	11.35	20.03	76.5
Arizona	16.86	15.97	- 5.3
Arkansas	8.22	7.54	- 8.3
California	20.49	18.98	- 7.4
Colorado	11.53	11.86	2.9
Connecticut	15.20	12.28	-19.2
Delaware	14.53	15.45	6.3
District of Columbia	56.30	50.28	-10.7
Florida	18.10	16.97	- 6.2
Georgia	13.97	12.73	- 8.9
Hawaii	8.75	9.43	7.8
Idaho	9.72	10.00	2.9
Illinois	15.22	14.24	- 6.4
Indiana	10.99	9.23	-16.0
Iowa	8.09	7.31	- 9.6
Kansas	8.70	7.61	-12.5
Kentucky	10.36	9.61	- 7.2
Louisiana	11.10	11.18	0.7
Maine	14.01	12.78	- 8.8
Maryland	19.70	14.46	-26.6
Massachusetts	17.87	14.38	-19.5
Michigan	18.61	16.07	-13.6
Minnesota	9.61	9.14	- 4.9
Mississippi	8.06	9.55	18.5
Missouri	9.82	9.04	- 7.9
Montana	13.45	14.45	8.4
Nebraska	9.82	8.29	-15.6
Nevada	23.00	26.50	15.2
New Hamshire	17.60	14.58	-17.2
New Jersey	16.50	24.64	-11.3
New Mexico	20.01	18.81	- 6.0
New York	20.24	19.03	- 6.0
North Carolina	14.27	12.47	-12.6
North Dakota	7.66	9.40	22.7
Ohio	12.95	11.95	- 7.7
Oklahoma	10.53	11.86	12.6
Oregon	14.24	13.26	- 6.9
Pennsylvania	13.88	12.07	-13.0
Rhode Island	12.75	13.51	6.0
South Carolina	11.09	11.47	3.4

Table 8. Age-Adjusted Mortality Rates, Cirrhosis of the Liver (ICDA 571) in the United States, 1973 and 1976[1]

States	1973	1976	Percentage Change
South Dakota	9.88	12.59	27.4
Tennessee	10.12	8.46	-16.4
Texas	11.61	11.56	- 0.4
Utah	11.66	9.12	-21.8
Vermont	13.44	11.02	-18.0
Virginia	14.39	12.68	-11.9
Washington	15.30	12.80	-16.3
West Virginia	12.49	13.12	5.0
Wisconsin	10.36	10.58	2.1
Wyoming	12.13	14.13	16.5
United States Total	15.0	13.6	- 9.3

[1] Computed by the direct method using as the standard population the age distribution of the total population of the United States as enumerated in 1940.

and suicides also contribute importantly to the total alcohol-related mortality. Between 60,000 and 100,000 deaths during 1977 from these causes were either directly or indirectly related to alcohol abuse during 1977.

Mortality rates for alcoholism and alcoholic psychosis are also of interest as surveillance measures for alcohol abuse, since presumably all of these deaths can be linked directly to excessive and prolonged alcohol consumption. However, very few deaths are attributed to alcoholic psychosis (table 9). Deaths ascribed to alcoholism have been rising in general since the early 1960s, but at a rate lower than the concomitant decrease in cirrhosis mortality rates.

This estimate is conservative because of the noninclusion of deaths from other causes in which alcohol plays a contributory role. For example, the accumulated evidence linking alcohol to cancer at certain sites (e.g., oropharynx, liver, esophagus), alcoholic cardiomyopathy, gastrointestinal hemorrhage, and pancreatitis is substantial. All of these conditions can end fatally, but due to lack of definitive quantitative information on alcohol involvement, they have not been included in this tabulation.

Morbidity

Alcohol-Related Morbidity

While alcohol-related morbidity data are limited in scope and quality, some information is available from the National Center for Health Statistics Hospital Discharge Survey (HDS). This survey continuously samples hospital discharges from nonmilitary, non-VA, and noninstitutional short-stay hospitals. More than 400 hospitals are included from among the 7,000 across the Nation. The sample is selected from a multistage probability sampling frame which considers the number of beds, the type of hospital ownership, and the region of the country. Up to five discharge diagnoses are abstracted from the hospital discharge summary using the coding classifications of the ICDA-8 with some modification.

Table 9. Estimated Deaths Related to Alcohol in the United States, 1977 (for Selected Causes)

Cause of Death	Number of Deaths for Indirect Causes - 1977	Percentage Related to Alcohol	Estimated Number Related to Alcohol
Alcohol as a Direct Cause			
Alcoholism	5,100	100	5,100
Alcoholic psychosis	318	100	318
Cirrhosis	30,848	41-95	12,648-29,306
Total for Direct Causes	32,266		18,066-34,724
Alcohol as an Indirect Cause			
Accidents			
Motor vehicle	49,510	30-50	14,853-24,755
Falls	13,773	44.4	6,115
Fires	6,357	25.9	1,646
Other[1]	30,455	11.1	3,381
Homicides	19,968	49-70	9,784-13,978
Suicides	28,681	25-37	7,170-10,612
Total for Indirect Causes	148,744		42,949-60,487
Total for Direct and Indirect Causes	185,010		61,015-95,211

SOURCE: U.S. Vital Statistics Mortality Detail Tape, 1977, Update of *Alcohol and Health 3,* page 10, table 4.

[1] Includes all accidents not listed above, but excludes accidents incurred in medical and surgical procedures.

According to data from the HDS (table 10), the estimated utilization of short-stay non-Federal hospitals for alcoholism (ICDA 303) increased from 424,000 in 1975 to 468,000 in 1977. This can be compared to 106,000 discharges for cirrhosis of the liver (ICDA 571), and about 13,000 discharges for alcoholic psychosis (ICDA 291) in 1977. It is not possible to identify repeat admissions and discharges of the same person from these data, but even so, it is clear that substantial health care requirements are associated with these three major alcohol-related diseases. With an average length of stay of nearly 8 days, cases with a primary diagnosis of alcoholism accounted for more than 3 million bed-days of inpatient utilization. That figure does not include outpatient treatment facilities, veterans hospitals, or long-term care and rehabilita-

Table 10. Estimated Number of Hospital Discharges From Short-Stay Hospitals By First-Listed Diagnosis, 1975-1977.

	1975		1976		1977	
Diagnosis (ICDA Code)	Number in Sample	Estimated Number in U.S.	Number in Sample	Estimated Number in U.S.	Number in Sample	Estimated Number in U.S.
Alcoholism (303)	(2,833)	424,000	(2,771)	429,000	(2,789)	468,000
Cirrhosis of Liver (571)	(643)	106,000	(595)	98,000	(608)	106,000
Alcoholic Psychosis (291)	(110)	18,000	(46)	7,000	(60)	13,000
Total: Alcohol-Related Discharges	(3,586)	548,000	(3,412)	534,000	(3,457)	587,000
Total: All Discharges	(231,670)	36,815,000	(223,196)	37,140,000	(224,134)	38,850,000
Percentage Alcohol-Related of All Discharges		1.5		1.4		1.5

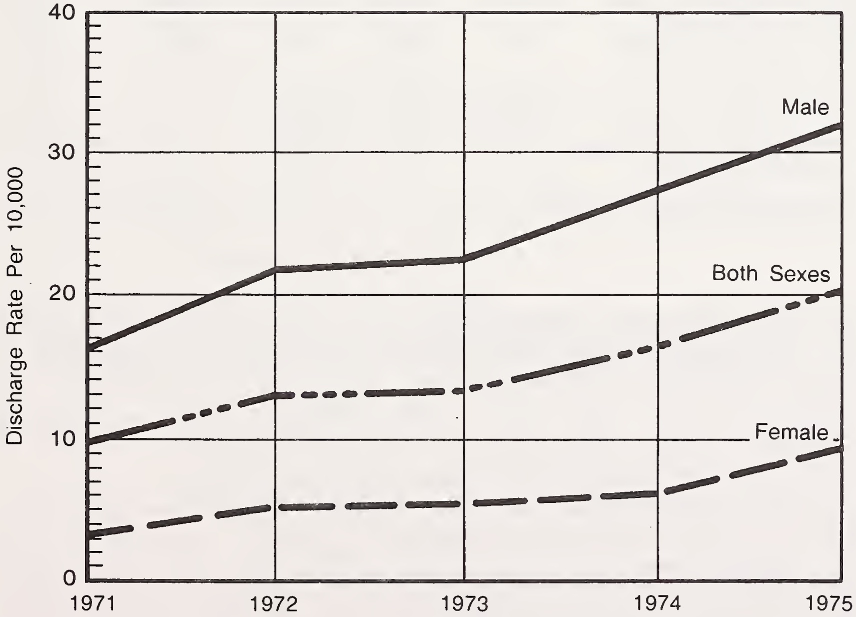
SOURCE: Unpublished data, National Center for Health Statistics; Hospital Discharge Survey, 1975-1977.

tion institutions. The rates of utilization have increased more sharply for males than for females (figure 13).

In addition to the primary diagnosis, these three discharge diagnoses, highly related to alcohol abuse, appear frequently in association with other disease entities. Table 11 displays 20 specific diagnostic categories yielding the largest number of alcohol-related discharges observed in association with other discharges. For example, of the estimated 421,220 discharges in which neuroses was the first-listed diagnosis, 26,340 or 6.3 percent were accompanied by at least one of the three alcohol-related discharge diagnoses of alcoholism, alcoholic psychosis, or cirrhosis. Overall, the three alcohol diagnoses were mentioned on 910,000 or 2.5 percent of the total of 36,815,000 discharges from short-stay hospitals in 1975 (U.S. Department of Health, Education, and Welfare n.d. *a*).

Problem drinking is having a large and growing impact on use of health services within the VA health care system. For example, the proportion of alcoholics and problem drinkers among the patient population has doubled between 1970 and 1977 for those under 35 years of age. Data from the VA hospital system show the problem is growing, but to enable comparison with HDS data for the civilian population, certain differences in the two systems must be noted. The

Figure 13. Rates of Discharge With Primary Diagnosis of Alcoholism From Short-Stay Non-Federal Hospitals, 1971-1975



SOURCE: U.S. Department of Health, Education, and Welfare. National Center for Health Statistics. Inpatient utilization of short-stay hospitals by diagnosis, United States.

Table 11. Estimated Frequency by First-Listed Diagnosis of Hospital Discharges That Also Include an Alcohol-Related Diagnosis, Short-Stay Hospitals, 1975

First-Listed Discharge Diagnosis (ICDA Code)[1]	Number of First-Listed Discharge Diagnoses Accompanied by an Alcohol-Related Diagnosis[2]	Total Number of First-Listed Discharge Diagnoses	Percentage of All Discharges With Any Alcohol-Related Diagnosis[2]
Alcoholism (303)[3]	423,910	423,910	—
Cirrhosis of Liver (571)[3]	106,010	106,010	—
Alcoholic Psychosis (291)[3]	17,930	17,930	—
Neuroses (300)	26,340	421,220	6.3
Symptomatic heart disease (427)	14,350	499,880	2.9
Chronic ischemic heart disease (412)	14,250	1,193,330	1.2
Gastritis and duodenitis (535)	12,590	288,630	4.4
Diseases of pancreas (577)	12,380	92,510	13.4
Diabetes mellitus (250)	11,260	532,810	2.1
Other diseases of intestines and peritoneum (569)	10,570	183,370	5.8
Other diseases of liver (573)	9,390	41,720	22.5
Other diseases of respiratory system (519)	8,370	296,250	2.8
Pneumonia, unspecified (486)	6,440	299,970	2.1
Varicose veins of other sites (456)	5,660	21,210	26.7
Adverse effect of other and unspecified drugs (977)	5,550	87,550	6.3
Cholelithiasis (574)	5,390	467,790	1.2
Other and unspecified laceration of head (873)	5,200	99,560	5.6
Drug Dependence (304)	5,150	33,650	15.3
Schizophrenia (295)	4,570	165,370	2.8
Injury, other and unspecified (996)	4,330	194,270	2.2
Personality disorders (301)	3,670	38,190	9.6
Other conditions (all other codes)	196,730	31,309,710	0.6
Total	910,040	36,814,840	2.5

[1] Eighth Revision International Classification of Diseases, Adapted 1965 (ICDA-8).

[2] The phrase "alcohol-related diagnosis" is defined in this table as a diagnosis of any one of the following ICDA-8 codes: 291 or 303 or 571.

[3] The first three diagnoses are defined in this table as alcohol-related and therefore the value in the third column would be 100 percent by definition.

VA population is almost totally adult males, while only about one-third of all HDS patients are men. The average length of stay for all patients in VA general hospitals in 1972 was more than 50 days; for HDS patients the average stay was less than 8 days. While one-fourth of the HDS hospitals had fewer than 100 beds, nearly all VA hospitals were at least this large. The VA reports alcoholism based on the presence of any of the following conditions: alcoholism, alcoholic psychosis, organic brain syndrome due to alcohol, or alcoholic cirrhosis of the liver. Some of the HDS data are based only on alcoholism (ICDA 303), and do not include the other disease entities. Still, even with these differences in comparability the magnitude of the problem among those in VA hospitals can be dramatically illustrated.

In VA hospitals the number of alcoholism discharges nearly doubled between 1970 and 1977 (table 12). Alcoholism was the primary diagnosis for more than 10 percent of the 942,000 discharges in 1977. The increase in VA alcoholism inpatient hospitalization has occurred even while VA outpatient services for alcoholism have become increasingly available. This increase is clearly revealed in two separate VA records systems (figure 14), the Patient Treatment File (PTF) and the Annual Patient Census (APC). The PTF contains data for all discharges from VA hospitals, while the APC collects data from a 20 percent sample of patients in VA hospitals on a single day.

Table 12. Discharges[1] From VA Hospitals With a Diagnosis of Alcoholism,[2] Fiscal Years 1970-1977

Fiscal Year	Total Number of Discharges (All Diagnoses)	Discharges with Principal or Associated Diagnosis of Alcoholism		Discharges with Principal Diagnosis of Alcoholism		Discharges with Associated Diagnoses of Alcoholism	
		Number	Percent	Number	Percent	Number	Percent
1970	692,518	104,502	15.1	53,396	7.7	51,106	7.4
1971	742,853	115,605	15.6	60,501	8.1	55,104	7.4
1972	776,227	124,269	16.0	65,288	8.4	58,981	7.6
1973	812,537	143,435	17.7	78,281	9.6	65,154	8.0
1974	827,245	156,798	19.0	88,398	10.7	68,400	8.3
1975	883,350	167,805	19.0	97,956	11.1	69,849	7.9
1976	915,302	165,883	18.1	101,231	11.1	64,652	7.1
1977	942,075	161,985	17.2	101,342	10.8	60,643	6.4

SOURCE: Carmody and Mesard 1978.

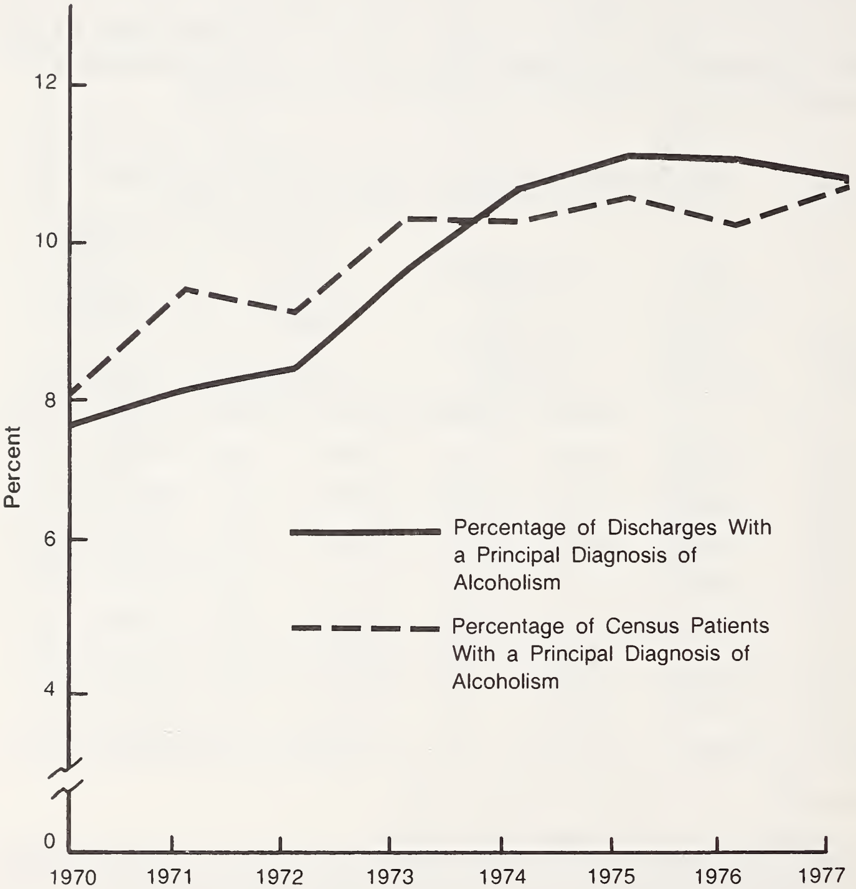
[1] Excludes all 1-day hemodialysis discharges.

[2] Alcoholism Diagnostic Codes: 291, alcoholic psychosis; 303, alcoholism; 309.13, organic brain syndrome due to alcohol; and 571, alcoholic cirrhosis of the liver.

Incidence Rates of Liver Cirrhosis

National level incidence rates of liver cirrhosis are virtually nonexistent. However, a recent study (Garagliano et al. 1979) has utilized hospital discharge records to estimate cirrhosis incidence, together with estimates for alcoholic hepatitis and fatty liver. Annual age-adjusted first hospitalization rates per 100,000 population for 15 selected U.S. cities are shown in table 13. A corollary finding from a survey of physicians during this study was that there were no incident cases which had not been hospitalized, confirming the appropriateness of using first hospitalization as an indicator of incidence. Most new cases with these

Figure 14. Principal Diagnosis of Alcoholism Among VA Hospital Patients, 1970-1977



SOURCE: Carmody and Mesard 1978.

diseases are not diagnosed in medical practice without being hospitalized.

These 15 cities were selected from all regions of the country and from among those cities that have "full coverage" for defined populations participating in the PAS reporting system of the Commission on Professional and Hospital Activities.

For each of the 15 cities, annual age-adjusted incidence rates were computed for four conditions which together encompass what is usually included in the diagnostic category, "Cirrhosis of the Liver," ICDA 571 (table 13). These incidence rates per 100,000 were 71.6 for white males and 32.2 for white females, more than triple the national cirrhosis mortality rates. Incidence rates for nonwhite males (119.5) and females (41.7) were similarly more than three times the mortality rates for comparable groups.

Other findings include large differences in incidence rates of alcoholic hepatitis between white males (24.8) and nonwhite males (76.0), a more than three-to-one ratio, and dramatic variations among reporting areas (table 14). Incidence rates for the total of Laennec's and other cirrhosis, alcoholic hepatitis, and fatty liver ranged from 23.7 to 112.4 per 100,000 population between the cities; larger differences were noted for the individual diseases.

Observations of trends and followup of cases are needed for interpretation of these results, efficacy of cirrhosis treatment, and development of case-fatality ratios.

Societal Consequences

Fatal Automobile Accidents

Motor vehicle accidents continue to be the leading cause of accidental death in the United States. After several years of declining vehicular accident death rates, commonly attributed to a reduction in the legal speed limit to 55 miles per hour, death rates may once again be on the rise. The annual number of deaths in 1978 climbed above 50,000, far above the 45,000 recorded in 1974 when lower speed limits became effective (table 15). Alcohol involvement in motor vehicle deaths is cited to be as high as 50 percent and is more apt to involve younger drivers. For example, in fatal accidents in 1976 in which alcohol involvement was reported, 45 percent of the drivers were aged 15-24, compared with all fatal accidents where this age group accounted for only 38 percent of the drivers (U.S. Department of Transportation 1977, 1978*a*, 1979*b*).

Table 13. Annual Age-Adjusted Incidence Rates/100,000 Population for all Cases of Laennec's Cirrhosis, Alcoholic Hepatitis, Fatty Liver, and Other Cirrhosis, by Diagnostic Category and Geographic Area, White Males: PAS Areas 1973[1]

	Diagnostic Category				
PAS Areas	Laennec's Cirrhosis	Alcoholic Hepatitis	Fatty Liver	Other Cirrhosis	Total
New England					
Portland, Maine	66.3	17.0	3.0	2.6	88.9
Bridgeport, Connecticut	48.7	45.3	14.5	3.9	112.4
Middle Atlantic					
Ithaca, New York	12.3	42.3	16.2	0.0	70.8
York, Pennsylvania	31.7	16.7	23.3	0.0	71.7
East North Central					
Lansing, Michigan	26.2	26.2	0.0	0.0	52.4
West North Central					
Topeka, Kansas	18.1	24.5	7.4	3.7	53.7
Winona, Minnesota	22.1	0.0	11.9	0.0	34.0
East South Central					
Clarksville, Tennessee	0.0	8.8	17.7	0.0	26.5
Maryville, Tennessee	44.6	15.9	0.0	0.0	60.5
West South Central					
Eunice, Louisiana	23.7	0.0	0.0	0.0	23.7
Mountain					
Albuquerque, New Mexico	40.3	19.8	13.6	3.6	77.3
Boulder, Colorado	25.8	30.0	0.0	5.0	60.8
Pacific					
Banning, California	24.7	0.0	0.0	0.0	24.7
Eureka, California	66.1	40.0	0.0	0.0	106.1
Medford, Oregon	62.5	0.0	0.0	0.0	62.5

SOURCE: Reprinted with permission of the authors and the publisher, from the Journal of Chronic Diseases, 32: 543–554; Garagliano, C.F., Lilienfeld, A.M., and Mendeloff, A.I., 1979, Pergamon Press, Ltd. Copyright 1979 by Pergamon Press, Ltd.

[1] Age-adjusted by direct method using age distribution of 1970 U.S. population as a standard. Includes definite, probable, and possible cases. PAS = Professional Activity Study.

Table 14. Annual Age-Adjusted Incidence Rates/100,000 Population, Sex Ratios, and Color Ratios for All Cases of Laennec's Cirrhosis, Alcoholic Hepatitis, Fatty Liver, and Other Cirrhosis, by Diagnostic Category, Color, and Sex, PAS Areas 1973[1]

	Diagnostic Category				
Color and Sex	Laennec's Cirrhosis	Alcoholic Hepatitis	Fatty Liver	Other Cirrhosis	Total
Incidence Rates					
White Males	36.0	24.8	8.0	2.8	71.6
White Females	14.6	9.8	5.0	2.8	32.2
Nonwhite Males	32.9	76.0	10.6	0.0	119.5
Nonwhite Females	13.8	25.9	2.0	0.0	41.7
Male/Female Ratios					
Whites	2.47	2.53	1.60	1.00	2.22
Nonwhites	2.38	2.93	5.30	0.00	2.87
Nonwhite/White Ratios					
Males	0.91	3.06	1.33	0.00	1.67
Females	0.95	2.64	0.40	0.00	1.30

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[1] Age-adjusted by direct method using age distribution of 1970 U.S. population as a standard. Includes definite, probable, and possible cases. PAS = Professional Activity Study.

Table 15. Motor Vehicle Deaths in the United States, 1970-1979

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Deaths	52,627	52,542	54,589	54,052	45,196	44,525	45,523	47,715	50,327	50,745
Death Rates per 100 Million Vehicle Miles	4.72	4.43	4.32	4.11	3.52	3.35	3.23	3.26	–	–

SOURCE: U.S. Department of Transportation 1979*a* (1970-1977 data); U.S. Department of Transportation 1980 (1978-1979 deaths).

Table 16 and figure 15 show the blood alcohol concentration (BAC) levels for those drivers in single vehicle fatal accidents who had positive BAC test results.

Younger drivers in such single vehicle accidents have lower BACs than older drivers. Table 16 indicates that only for BAC values greater than 0.15 are there as many or more drivers in the older age groups *combined* as in the 18-25 age group. BACs in the range of 0.05 to 0.10 are generally regarded by most States as evidence of driving under the influence of alcohol. Figure 15 shows a consistent drop in each older age group of percentage drivers with positive BACs.

Table 16. Drivers with Positive Blood Alcohol Concentrations (BAC) in Single Vehicle Fatal Highway Accidents, by Age and BAC, United States, 1976

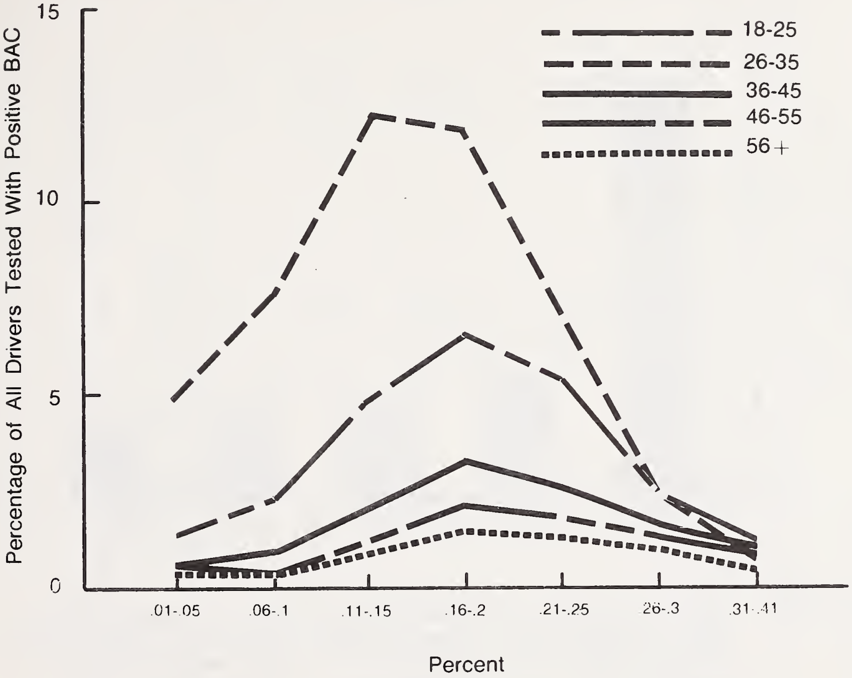
BAC	Age Number (Percentage of Grand Total)					
	All Ages	18-25	26-35	36-45	46-55	Over 55
All	4762 (100.0)	2251 (47.3)	1152 (24.2)	607 (12.7)	435 (9.1)	317 (6.7)
.01 - .05	399 (8.4)	237 (5.0)	65 (1.4)	36 (0.8)	31 (0.7)	30 (0.6)
.06 - .10	595 (12.5)	368 (7.7)	111 (2.3)	50 (1.0)	35 (0.7)	31 (0.7)
.11 - .15	1040 (21.8)	586 (12.3)	240 (5.0)	104 (2.2)	62 (1.3)	48 (1.0)
.16 - .20	1203 (25.3)	568 (11.9)	311 (6.5)	155 (3.3)	99 (2.1)	70 (1.5)
.21 - .25	875 (18.4)	343 (7.2)	253 (5.3)	122 (2.6)	90 (1.9)	67 (1.4)
.26 - .30	429 (9.0)	113 (2.4)	112 (2.4)	83 (1.7)	74 (1.6)	47 (1.0)
.31 - .41	221 (4.6)	36 (0.8)	60 (1.3)	57 (1.2)	44 (0.9)	24 (0.5)

SOURCE: Malin et al. 1978.

Figure 16 presents the above data, taking into account the number of miles driven by drivers in each age group. In single vehicle fatal accidents, there were 1.28 younger drivers (18-25 years) with a positive BAC per 100 million driver miles. This is about four times the rate of .36 per 100 million miles for those aged 26-35 years, and approximately eight times the rate of .16 for those 55 and over.

The average BAC ranges between 0.18 and 0.20 for the four older age groups, while those 18-25 years have a mean BAC of 0.15. This further supports the hypothesis that younger drivers with lower BACs are involved in a disproportionately higher number of fatal accidents than drivers over 25. A combination of driver inexperience and lower tolerance to alcohol may account for the substantially higher involvement of younger drivers in fatal accidents, even though their BAC levels are relatively lower than those of older drivers so involved.

Figure 15. Proportion of Drivers With Positive Blood Alcohol Concentration (BAC) by Age and BAC in Single Vehicle Accidents, 1976



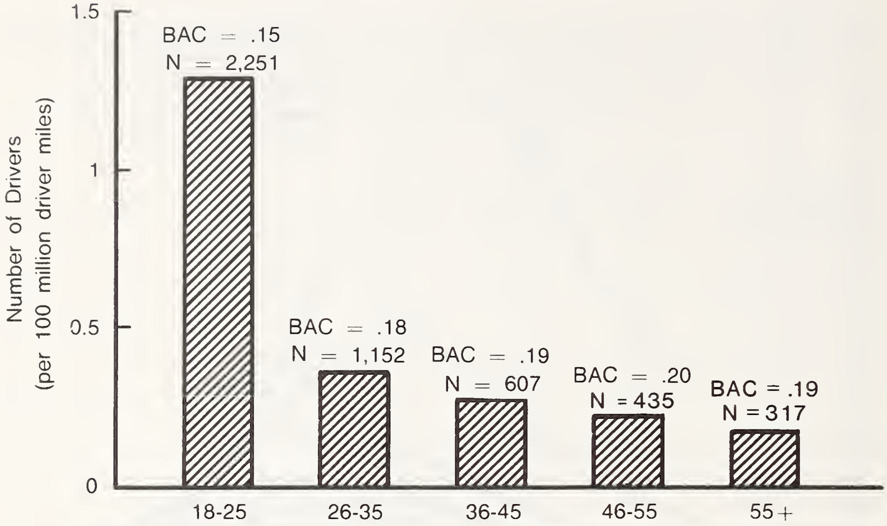
SOURCE: U.S. Department of Transportation, National Highway Traffic Safety Administration. Fatal Accident Reporting System, 1976 Annual Report. Data generated by Alcohol Epidemiological Data System staff.)

Alcohol and Crime

A national probability sample of inmates of local and county jails surveyed by the Law Enforcement Assistance Administration (LEAA) in 1978 (U.S. Department of Justice 1978) provides a recent source of information about the preoffense drinking behavior of those convicted and serving sentences, as well as the usual drinking patterns of all inmates, including those awaiting trial, transfer, or in custody for other reasons. Data from this jail survey suggest that heavy alcohol consumption may be directly related to crime, arrest, conviction, and incarceration.

Results show that heavier drinkers tend to be overrepresented in the jail population and more serious offenses appear to be committed by heavier drinkers. Drinking reported at the time of the offense for which a person was convicted, however, for all categories of offenses, tends to be less than estimated usual drinking levels. The level of probable alcohol involvement in violent crime appears directly related to the usual or historic drinking behaviors of those convicted. Not surprisingly, perhaps, alcohol figures more heavily in attempted murder than in

Figure 16. Drivers With Positive BAC Who Were Involved in Fatal Single Vehicle Accidents Per 100 Million Miles



SOURCE: U.S. Department of Transportation, National Highway Traffic Safety Administration. Fatal Accident Reporting System, 1976 Annual Report. U.S. Department of Transportation NHTSA and Federal Highway Administration. Highway Safety, 1977.

Table 17. Pre-Offense Drinking[1] Reported by Convicted Jail Inmates, 1978[2] (in Percentages)

Convicts	(*N*)	No Response	Not Drinking	Less than 2 ounces Abs. Alcohol	2-8 ounces Abs. Alcohol	8 ounces Abs. Alcohol	Total
Total	(3,041)	19.4	36.6	8.9	17.1	18.0	100
Sex							
Male	(2,099)	18.2	36.3	9.0	17.7	18.8	100
Female	(942)	38.3	42.1	6.4	8.8	4.4	100
Color							
White	(1,653)	15.1	34.3	8.2	18.9	23.5	100
Black	(1,304)	26.5	40.8	10.2	13.7	8.9	100
Other	(84)	6.0	25.2	3.7	32.0	33.1	100
Age							
Under 20	(422)	21.1	38.4	7.6	17.9	15.0	100
20-29	(1,679)	18.4	40.3	8.8	15.5	17.0	100
30-39	(549)	23.8	37.2	7.0	14.2	17.7	100
40-49	(251)	14.9	21.0	11.5	25.5	27.2	100
Over 49	(140)	16.8	20.2	14.8	26.8	21.4	100

SOURCE: Data adapted by the Alcohol epidemiology Data System staff from U.S. Department of Justice, Law Enforcement Assistance Administration; Survey of Inmates of Local Jails, 1978.

[1] The period during which the above alcohol was consumed was in most cases 1 day or less, but in a few cases (2.7 percent) extend beyond 1 day.

[2] Proportions are weighted to represent the total convicted jail inmate population in 1978.

murder itself. Of all those convicted for attempted murder, 100 percent reported consumption of at least 4 ounces of ethanol, and 71 percent of those reported 8 ounces or more prior to the offense. Of those convicted for murder, 68 percent reported drinking at least 4 ounces and 59 percent reported drinking 8 ounces or more prior to the offense.

Table 17 presents levels of preoffense drinking for convicted inmates by sex, race, and age. A substantive proportion of the men (37 percent) and 13 percent of the women can be described as having been drinking moderately heavily or very heavily prior to the offense for which they were convicted. Substantially more whites (42 percent) than blacks (23 percent) are similarly classified. The race code "other" (including American Indians, Alaskan natives, Asians, and Pacific Islanders) showed the greatest proportions at these higher consumption levels; fully 65 percent of this fraction of the convicted jail population consumed more than 2 ounces of absolute alcohol prior to the offense, and more than half of these individuals drank more than 8 ounces.

A relatively consistent pattern in association with age of prisoner emerges when cross-classified by amount of alcohol consumed. In general, the older the inmates, the more likely they were to have been drinking, and the more likely that that drinking was moderately heavy to very heavy. With few exceptions, more of the older inmates had been drinking prior to the offense for which they were convicted, and they had also consumed greater amounts of alcohol than had the younger inmates.

Table 18 illustrates the pattern of reported usual alcohol consumption by those convicted. The values derived for the various demographic groups mirror in magnitude and direction the estimates obtained for preoffense drinking behavior. Men drink more heavily than women; whites more heavily than blacks; and those in race code "other," the heaviest of all. The age-consumption level pattern observed for preoffense drinking behavior establishes itself with reported usual drinking patterns. Among inmates, the older age groups contain fewer abstainers. Further, the older inmates were found to drink more heavily.

Table 19 relates levels of preoffense alcohol consumption to type of crime and yields data that support the construct that alcohol may be a catalyst for violence. Higher proportions of those convicted for violent offenses against persons, or for offenses against public order, said they had been drinking at heavier levels than did those convicted of other crimes.

Table 18. Usual Drinking Habits[1] Reported by Convicted Jail Inmates, 1978[2] (in Percentages)

Convicts	*(N)*	No Response	Unknown, Not Drinking	Less than 2 Ounces Abs.Alcohol	2-8 Ounces Abs. Alcohol	8 Ounces Abs. Alcohol	Total
Total	(3,041)	1.1	14.5	16.1	34.4	33.9	100
Sex							
Male	(2,099)	1.0	13.3	15.5	35.0	35.1	100
Female	(942)	2.3	32.9	25.3	25.9	13.6	100
Color							
White	(1,653)	1.4	9.6	12.1	34.6	42.4	100
Black	(1,304)	0.8	22.4	22.3	34.3	20.2	100
Other	(84)	0.5	4.0	11.4	32.2	51.9	100
Age							
Under 20	(422)	0.8	16.2	16.2	32.3	34.4	100
20-29	(1,679)	1.0	14.3	16.2	35.6	32.9	100
30-39	(549)	1.4	17.5	16.5	34.6	30.1	100
40-49	(251)	0.5	10.2	14.8	31.6	42.9	100
Over 49	(140)	3.4	9.1	16.1	32.0	39.4	100

SOURCE: Data adapted by the Alcohol Epidemiology Data System staff from U.S. Department of Justice. Law Enforcement Administration; Survey of Inmates of Local Jails, 1978.

[1] Since the period of drinking was not specified, these consumption levels are not on a comparable basis to those on prior tables. However, the similarity of the demographic patterns suggests a high order of consistency between the tables.

[2] Proportions are weighted to represent the total convicted jail inmate population, 1978.

Table 19. Pre-Offense Drinking, By Crime, Reported by Convicted Jail Inmates, 1978 (in Percentages)

Convicts	*(N)*	No Response	Not Drinking	Less than 2 Ounces Abs.Alcohol	2-8 Ounces Abs. Alcohol	8 Ounces Abs. Alcohol	Total
Total	(3,041)	19.4	36.6	8.9	17.1	18.0	100
Violent Offenses Against Persons	(648)	20.6	35.1	9.1	15.0	20.2	100
Offenses Against Property	(1,285)	21.2	41.1	6.4	14.4	16.9	100
Drug-Related Offenses	(371)	23.3	47.9	9.3	13.3	6.2	100
Offenses Against Public Order	(698)	13.2	25.3	12.6	25.9	23.0	100
Unknown Offenses	(39)	23.7	41.7	7.2	10.7	16.7	100

SOURCE: Data adapted by the Alcohol Epdiemiology Data System staff from U.S. Department of Justice, Law Enforcement Administration; Survey of Inmates of Local Jails, 1978.

Continued Research on the Epidemiology of Alcohol Use and Abuse

Methodologic Research

An important research thrust within the NIAAA Laboratory of Epidemiology and Population Studies is the development of methods to improve estimates of alcohol-related problems and consequences and the identification of those at risk for such problems. The continued development in understanding the distribution and determinants of alcohol abuse and alcoholism is paced by a number of issues toward which resolution is being attempted. Improvements in the collection of information on beverage sales, on data from self-reported surveys, on consequences of alcohol use and abuse, and on causal associations are being sought. Such product expansion has led to increasing difficulty in generating accurate estimates of apparent consumption, a key component of data used as indirect indications of consumption at the State and county levels. Certain States already maintain such records, and provide distribution and sales data by brand, container size, and alcohol content.

Alcohol problems, of course, include a wide spectrum of medical and social ills. Recent studies (Armor et al. 1978) testify to the multiplicity of drinking problems of clinically diagnosed alcoholics. The general trend of these studies is to suggest the existence of a complex typology of problem drinkers that embraces a wide range of medical, trauma, social, and legal problems which impact different populations at risk. Current studies are under way to develop composite indicators of these problems which reflect the seriousness and complexity of alcohol problems within a geographic area or within a sociodemographic group.

Two principal methods of generating composite alcohol indicators have been developed during recent years. The first is based on interview surveys and is probably best exemplified by composite problem scales, such as Current Tangible Consequences (CTC) (Cahalan 1976; Cahalan et al. 1969). In this technique, the respondent's alcohol-related personal and social problems (e.g., employment, legal, family, and health) are summed, yielding a single problem score. A CTC score for a geographic area or demographic group is calculated by averaging the scores of those surveyed.

The second method of generating a composite problem indicator employs vital statistics and agency data which typically reflect total coverage of the entire area or demographic group of interest. One recent effort employed data about alcohol-related arrests, clinic and hospital admissions, suicide and cirrhosis mortality, and driver's license suspensions (Watt and Merrill 1963). The data were factor-analyzed and suggest a single underlying dimension for all of the component variables. Social areas and demographic groups were assigned a composite factor "score" which became, in essence, an indicator of the combined strength of the many alcohol problems underlying the data.

Another recent approach to combining alcohol problem indicators into factorial indexes is reported by Wilson (1979). This study, performed using variables measured in each of the 50 States, resulted in two composite indicators representing a variety of the alcohol-related problems. The first factor reflects variables monitoring fatal automobile accidents, alcoholism mortality, alcohol poisoning mortality, and alcohol psychosis mortality. The second factor is related primarily to cirrhosis mortality.

A significant finding of this research is that the two factors are concentrated in different geographic areas and in different demographic populations. States and counties that have a high level of alcohol casualties (Factor 1) do not correspond with counties demonstrating a high level of alcohol-related chronic health problems (Factor 2). Moreover, the two factors appear to be related to two different populations at risk. Alcohol-related casualties appear to be most highly concentrated in rural and nonurbanized poverty areas. Chronic health problems, in contrast, appear most prominent in highly urbanized, affluent areas surrounding the major cities.

On the basis of these results, research is continuing in an effort to map the distribution of these two composite indicators at the county level. Preliminary data which have been generated to produce synthetic or composite indicators of problems suggest that geographic patterns likely to emerge will be helpful in assessing the nature and extent of alcohol-related problems, and will allow use of indirect indicator data as components of an alcohol abuse surveillance system. Of particular note is the promise composite indicators hold for estimating the extent of alcohol-related problems for small geographic areas.

Sales Data

At present an elaborate system exists for the collection of data on beverage sales. The States, through their function as tax-collecting agencies, provide the basic information which is helpful in assessing trends in apparent alcohol consumption. Although data are available by State for each of the major beverage types—beer, wine, and distilled spirits—the utility of the information would be greatly enhanced if it were available for more discrete geographic areas (e.g., for each of the 3,143 counties in the United States), if more detail could be obtained on the alcohol content of the beverages sold, and if demographic and other characteristics of the purchasers were known. Some States—e.g., Pennsylvania, Delaware, West Virginia—do report some beverage sales data on a county basis, indicating that collection of information in this detail is feasible. Availability of this information for all counties would enhance the estimation of trends in apparent consumption and the apparent causes of changes in sales patterns. Data on beverage sales by county could be related to demographic characteristics of each county—the age, sex, and ethnic distribution of the resident population, and local circumstances and regulations regarding the availability of alcoholic beverages. It would also allow comparison with the consequences of apparent consumption, such as mortality statistics (e.g., cirrhosis, traffic fatalities) which can be tabulated for each county.

It may also be feasible for agencies to collect data to describe the alcohol content of all beverages sold. The beverage marketplace has burgeoned with a wide variety of brands—both domestic and imported—with varying percentages of alcohol.

Another deficiency of the current beverage sales data is a nearly complete lack of information on the beverage purchaser. Only in selected situations (e.g., at some military post exchanges) is it possible to identify individual purchasers. Some countries (e.g., Finland) have developed systems to register beverage purchasers. Samples of purchasers could be studied to obtain information on personal and other characteristics which would help describe the population of beverage purchasers. Analysis of these characteristics could be directed toward an increased understanding of the factors related to purchase of various types and amounts of beverage alcohol.

General Population Surveys

Because of a lack of standard, objective "markers" with sufficient sensitivity and specificity to identify alcohol-abusing persons in population surveys, reliance on the self-reports of participants in general population surveys to assess trends in alcohol use and abuse will continue to be necessary. This approach has had a number of limitations which could be at least partly minimized by appropriate planning and additional research. A lack of comparability among surveys continues to limit progress which could be at least partly corrected if researchers and surveyors gave more attention to the importance of data collection in a form to permit comparability with previous work. Some progress has been made over the past decade, so that, within limits, results from several national surveys carried out during the 1970s can be compared to one another.

Based on comparisons of beverage sales data with surveys of self-reports of beverage consumption, self-reports appear to account for only about one-third to one-half of alcohol sold and presumably consumed. Several possible factors may contribute to this apparent discrepancy. These include: (1) underrepresentation in the samples surveyed of persons in the general population who drink heavily; (2) exclusion of specified population groups which may contain a disproportionately large number of heavy alcohol consumers (e.g., military forces, incarcerated and hospitalized persons); (3) inadequate questionnaire and interview techniques and procedures; and (4) conscious and unconscious underreporting on the part of respondents. While not all of these possible deficiencies are easily correctable, steps could be taken to minimize the effects of some. For example, sampling frames could be structured to attempt to interview individuals who may not ordinarily be included in typical household surveys. Surveys of special population groups could be conducted using comparable methods to surveys of general households to obtain more complete coverage of the total U.S. population.

More methodologic research is needed to determine what kinds of questions elicit the most accurate and complete description of alcohol consumption and under what circumstances. What, for example, is the optimal period of recall—a week, a month, a year, other—to be able to accurately characterize a person's drinking patterns? Attention also needs to be placed on the style of drinking. Emphasis should be given to collecting information in a quantifiable manner that also allows an opportunity for separating various drinking patterns. Evidence exists that different styles of drinking are associated with different types of consequences (Polich and Orvis 1979).

Alcohol-Related Consequences

The consequences of alcohol use and abuse are manifold, and this fact contributes significantly to the complexities in adequately defining and describing alcohol abuse and problem drinking. These complexities hamper more rapid progress in conducting adequate descriptive studies and in developing investigations to assess risk and to seek the major determinants in the development of consequences. The types of consequences are highly varied—medical, psychological, familial, occupational, social—and within each general category a long list of specific outcomes is possible. There may be greater utility in studying the epidemiology of specific outcomes rather than aggregating several alcohol-related consequences. This appears true because some outcomes are associated with specific ages, or sex, or other characteristics of persons or places and not with others. For example, cirrhosis of the liver is one of the well-recognized common outcomes of alcohol abuse. But since it requires years of prolonged, apparently heavy drinking to develop, it is not an important consequence among younger problem drinkers. To further complicate matters, it also appears not to be an inevitable outcome of prolonged, heavy alcohol consumption, even among older persons. In fact, only a small fraction (perhaps 15 to 20 percent, depending on studies reviewed—Jellinek 1959) of persons who could be identified as long-term heavy alcohol users develop liver cirrhosis to a degree to present a significant medical problem.

In addition to the multiple outcomes that can be identified as alcohol-related, many of these outcomes can occur more than once. Distinguishing between a first-time consequence and a recurrent episode may be quite important in being able to separate factors that lead to a given consequence from factors that relate to continuing to have repeated consequences.

Multiple Cause of Death Data

Finally, it should be noted that perhaps the most potentially useful of all mortality data sets is as yet unavailable for analysis. The National Center for health Statistics compiles information from all certified deaths in the United States. Among the information which appears on a standard death certificate is the underlying cause of death data available in aggregated form from NCHS for relatively current time periods and routinely obtained. Also contained on these certificates are up to four contributing causes of death, heretofore uncoded on the master mortality data files. The opportunity to investigate mortality data for the entirety of the U.S. population, where an alcohol-linked cause may appear in association with any underlying cause of death, not alcohol-specific, is an intriguing one. Substantial efforts are underway to obtain these additional data; when released they promise to add substantially to an understanding of the impact of beverage alcohol on the health of the U.S. population.

Summary

The decade of the 1970s appeared to be a time of transition in alcohol use and abuse. Overall U.S. apparent consumption of beverage ethanol by adults rose 8 percent to reach the highest levels in more than 100 years. Beer sales have risen so that ethanol from beer nearly equals that from wine and liquor combined.

Regionally, patterns of alcohol per capita consumption are shifting with significant increases in most of the Southern and Western States. All States increased in per capita consumption by adults except for Alaska, the District of Columbia, and four Eastern industrial States. Nevada now leads the Nation in apparent ethanol consumption by adults and is second in cirrhosis mortality rates (tables 2 and 8).

Alcohol-related mortality for several selected causes (table 9) appears to be remaining relatively constant. One bright spot is that cirrhosis mortality has declined each year since it reached a peak in 1973. However, the rise in other alcohol-related mortality (especially highway accidents) has roughly compensated for the decrease in cirrhosis mortality.

Nationally, males far outnumber females in self-reported alcohol consumption rates (nearly four to one), cirrhosis morbidity and mortality rates (more than two to one), alcohol treatment in NAPIS records (nearly five to one), alcohol-related discharges from short-stay hospitals (more than three to one), jail convictions for which the offender was drinking heavily prior to the crime (four to one), and driver involvement in highway fatalities where alcohol involvement was reported.

Cirrhosis mortality is disproportionately high among black Americans, particularly in the seven major cities which account for half of the black cirrhosis deaths. Rates among black males aged 25 to 34 in these cities are as much as 10 times higher than for white males of the same age (figure 12). For all ages, cirrhosis mortality rates among black Americans are nearly twice those for white Americans.

There were at least 910,000 discharges in 1975 (2-1/2 percent of all discharges) from short-stay hospitals that were directly linked to alcohol-related causes. Of these, 424,000 discharges had a first-listed diagnosis of alcoholism. The remaining 486,000 alcohol-related discharges included cirrhosis, neuroses, alcohol psychoses, symptomatic and chronic ischemic heart disease, gastritis, duodenitis, diseases of the pancreas and liver, diabetes, pneumonia and other respiratory diseases, esophageal varices, vitamin deficiencies, trauma, and other injuries—all as first-listed diagnoses accompanied by alcohol-related diagnoses.

Seventeen percent of all discharges from VA hospitals were associated with alcoholism (table 12).

Data and analyses needed for a more complete understanding of the magnitude, patterns, and trends of alcohol use and abuse, however, are at the earliest stages of development. Current efforts are also underway to develop measurement indexes and analytic techniques. Future results of this work should provide significant improvements in the measurement and understanding of alcohol use and abuse at national, State, and local levels and for specific population groups. Ultimately, research such as this should provide significant analytic aids needed for improving planning and allocation of resources and the prevention and treatment of alcohol-related problems among large proportions of those groups at highest risk for alcohol abuse and alcoholism.

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Chapter 4

International Trends in Alcohol Consumption and Related Pathologies

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Abstract

In this chapter, statistical data are presented on the apparent consumption of total alcohol, wine, distilled spirits, and beer in western industrialized countries (Australasia, North America, and western Europe) in 1950, 1960, 1970, and 1978. Graphs are provided that compare alcohol consumption to levels of cirrhosis mortality rates for selected countries (United States, Belgium, Denmark, Italy, the Netherlands, the United Kingdom, Finland, New Zealand, and Australia). These data indicate that: (1) Internationally, there has been generalized increases in total alcohol consumption per capita from 1950 to 1978 except in countries of highest consumption, e.g., France, Italy, Protugal, Spain, and Switzerland; (2) The trend in wine consumption has shown the greatest tendency to decline in countries with the highest per capita consumption, and a sharp increase since 1950 and 1960 in all other western industrialized countries; (3) The trend in the consumption of spirits has also tended to increase since 1960 in all western industrialized countries, except several with the highest per capita consumption (France, Austria, and West Germany); and (4) Beer consumption has shown the most powerful upward trends in nearly all of these contries, except in the countries of highest traditional consumption (West Germany, Belgium, Australia, New Zealand, Ireland, the United Kingdom, and Denmark). A comparison of the international mortality rates with alcohol consumption indicates that it is not easy to predict the alcohol-related pathologies by country, and that rates and trends of the different causes of alcohol-related mortality are not closely related to one another by country.

Introduction

Internationally, there has been a generalized increase in total alcohol consumption per capita from 1950 to 1978 except in countries of highest consumption, e.g., France, Italy, Portugal, Spain, and Switzerland. In general, the higher the total alcohol consumption level in 1930, the lower the percentage increase since. This is also true for each beverage separately. The overall increase in alcoholic beverage consumption is especially high in countries that started at a level of less than 10.0 liters per capita (table 1) in 1950 or 1960.

Table 1. Apparent Consumption of Total Alcohol in Liters Per Capita in Western Industrialized Countries,1950-1978

					Peak		Percentage Change Based on Log Trends[1]	
Country	1950	1960	1970	1978	Year	Value	1950-1978	1970-1978
Australasia								
Australia	n.a.	6.2	7.8	9.3	1978	9.3	59.94	22.40
Japan	n.a.	n.a.	n.a.	3.0	1976	3.2	n.a.	11.85
New Zealand	n.a.	6.1	7.1	8.7	1978	8.7	65.09	19.65
North America								
Canada	4.4	4.82	6.5	8.8	1978	8.8	107.15	35.04
United States	3.8	3.6	4.6	5.8	1978	5.8	54.44	24.90
Western Europe								
Austria	n.a.	6.9	9.4	11.5	1978	11.5	156.60	15.86
Belgium	6.5	6.6	8.7	9.9	1976	10.1	63.38	14.32
Denmark	3.6	3.8	6.1	7.5	1976	7.8	139.42	23.94
Finland							226.52	54.83
France	17.2	17.3	15.6	15.0	1975	15.8	-18.65	-2.36
Greece	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Iceland	n.a.	1.8	2.7	3.1	1974	3.3	85.85	12.40
Ireland	3.3	3.4	5.4	9.6	1978	9.6	158.66	83.66
Italy	9.2	12.2	13.7	11.8	1973	13.8	36.60	-15.13
Netherlands	2.1	2.6	5.5	8.7	1978	8.7	357.54	60.10
Norway	1.5	1.8	2.6	3.1	1977	3.3	137.39	23.27
Portugal	n.a.	n.a.	9.8	13.5	1971	14.3	0.58	27.17
Spain	n.a.	n.a.	10.0	11.7	1978	11.7	32.07	16.94
Sweden	n.a.	2.5	3.7	4.0	1976	4.2	87.34	12.04
Switzerland	n.a.	8.2	10.6	10.1	1975	10.9	64.54	-3.30
United Kingdom	4.9	5.1	6.4	8.6	1978	8.6	77.03	33.49
West Germany	2.9	6.9	10.4	11.3	1976	11.8	310.04	4.10

SOURCE: See table 7.

[1] Each year between 1950 (or earliest available year) and 1978 (or latest available year used in estimating log trends. First years available for Australia, Japan, New Zealand, Austria, Greece, Iceland, Portugal, Spain, and Sweden are 1951, 1971, 1951, 1961, 1964, 1962, and 1951, respectively.

The trend in wine consumption has shown the greatest tendency to decline in countries with the highest per capita consumption (more than 100 liters per capita). These countries include France (down 29.96 percent from 1950 to 1978), Italy (down 20.98 percent from 1970 to 1978), and Portugal (down 13.47 percent from 1955 to 1978). In almost all other Western industrialized countries, however, there is a sharp trend of increase in wine consumption since 1950 and 1960 (table 2).

Spirits has also shown a trend of increases since 1960 in all Western industrialized countries, except several with the highest per capita consumption—France, Austria, and West Germany (table 3). In the latter countries, there is either no trend or a slight decline. There are exceptions to these patterns, however. In a few countries, which have *recently* had very high consumption levels (i.e., greater than 3.0 liters per capita), the long-term trend has been steeply upward and one can observe only the beginning signs of stabilization; examples are Canada, the United States, Finland, and Sweden.

Table 2. Apparent Consumption of Wine, in Liters Per Capita in Western Industrialized Countries, 1950-1978

					Peak		Percentage Change Based on Log Trends[1]	
Country	1950	1960	1970	1978	Year	Value	1950-1978	1970-1978
Australasia								
Australia	n.a.	5.2	8.7	14.3	1978	14.3	93.53	63.46
Japan	n.a.	0.1	0.3	0.3	1973	0.5	210.00	-37.20
New Zealand	2.3	2.3	5.5	9.5	1975	11.8	379.10	68.07
North America								
Canada	1.7	2.1	4.2	7.26	1978	7.3	331.98	62.73
United States	3.5	3.4	4.9	7.2	1978	7.2	38.59	
Western Europe								
Austria	14.2	20.8	31.1	35.0	1976	36.3	175.83	13.70
Belgium	5.7	7.8	13.9	17.8	1978	17.8	220.23	25.63
Denmark	1.4	2.5	4.5	12.2	1976	12.5	761.18	140.54
Finland	0.5	1.2	3.4	8.3	1974	9.2	1511.64	182.62
France	124.5	126.9	106.8	98.0	1955	138.7	-29.96	-7.99
Greece	n.a.	40.8	40.0	42.0	1957	47.4	-10.68	2.31
Iceland	n.a.	0.8	1.6	4.3	1978	4.3	376.26	146.19
Ireland	0.8	0.9	3.3	4.4	1977	5.0	355.64	8.56
Italy	83.0	109.5	113.7	91.0	1968	114.2	14.03	-20.98
Netherlands	0.5	1.9	5.1	12.2	1978	12.2	2287.67	140.03
Norway	0.9	1.2	2.3	2.9	1977	3.4	274.23	37.04
Portugal	n.a.	85.0	72.5	91.3	1966	131.1	-13.47	16.53
Spain	47.0	50.7	52.8	70.0	1975	76.0	46.95	12.89
Sweden	1.2	3.3	6.3	9.1	1977	9.5	689.27	43.68
Switzerland	28.3	41.2	42.3	45.9	1978	45.9	50.37	3.77
United Kingdom	0.8	1.6	2.9	6.5	1978	6.5	660.15	108.53
West Germany	4.7	10.8	16.9	23.8	1978	23.8	387.81	32.74

SOURCE: See table 7.

[1] Each year between 1950 (or earliest available year) and 1978 (or latest available year) used in estimating log trend. First years available for Australia, Japan, Greece, Iceland, and Portugal are 1955, 1959, 1955, 1960, and 1955, respectively.

Beer consumption has shown the most powerful upward trends in consumption in nearly all industrialized countries (table 4). This is the case except in the countries of highest traditional consumption, namely, West Germany, Belgium, Australia, New Zealand, Ireland, the United Kingdom, and Denmark. In some of these countries, as well as in the moderately high consuming countries of Canada and Switzerland, the upward trends may have begun to stabilize in the early and mid 1970s. (Data sources for tables 1 through 6 are listed in table 7.)

Table 3. Apparent Consumption of Distilled Spirits, in Liters Per Capita in Western Industrialized Countries, 1950-1978

					Peak		Percentage Change Based on Log Trends[1]	
Country	1950	1960	1970	1978	Year	Value	1950-1978	1970-1978
Australasia								
Australia	n.a.	0.83	1.01	1.3+	1978	1.3+	71.09	30.99
Japan	n.a.	n.a.	n.a.	1.11	1974	1.42	n.a.	1.12
New Zealand	0.91	1.04	1.04	2.00	1978	2.00	73.93	111.62
North America								
Canada	1.28	1.51	2.17	3.45	1975	3.61	117.52	62.88
United States	1.96	2.04	2.84	3.17	1978	3.17	n.a.	11.69
Western Europe								
Austria	1.18	2.53	2.16	1.37	1973	2.40	22.22	-43.89
Belgium	0.70	0.77	1.32	2.38	1978	2.38	221.12	68.91
Denmark	0.53	0.53	1.26	1.36	1976	1.90	283.56	27.76
Finland	1.39	1.32	1.84	2.82	1976	3.0	123.94	49.52
France	2.73	2.03	2.30	2.50+	1975	2.60	-6.10	13.43
Greece	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Iceland	0.50	1.57	2.23	2.25	1974	2.65	65.11	-1.23
Ireland	0.70	0.75	1.46	2.36	1978	2.36	165.27	42.07
Italy	0.70	0.95	1.80	2.0+	1973	2.2	215.49	9.04
Netherlands	1.47	1.14	2.04	3.01	1975	3.39	130.24	49.54
Norway	1.22	1.26	1.56	1.56	1977	1.90	66.62	13.74
Portugal	n.a.	n.a.	0.50	0.9	1978	0.9	97.04	26.20
Spain	n.a.	n.a.	2.84	3.0+	1976	3.1	38.79	6.98
Switzerland	1.13	1.44	1.73	2.0	1974	2.15	84.98	5.81
United Kingdom	0.52	0.76	0.94	1.72	1978	1.72	200.07	79.33
West Germany	1.08	1.92	3.01	2.99	1976	3.33	213.80	1.39

SOURCE: See table 7.

[1] Each year between 1950 (or earliest available year) and 1978 (or latest available year) used in estimating log trend. First years available for Australia, Japan, Portugal, and Spain are 1951, 1971, 1964, and 1962, respectively.

Table 4. Apparent Consumption of Beer, in Liters Per Capita in Western Industrialized Countries, 1950-1978

Country	1950	1960	1970	1978	Peak Year	Peak Value	Percentage Change Based on Log Trends[1] 1950-1978	Percentage Change Based on Log Trends[1] 1970-1978
Australasia								
Australia	n.a.	101.8	122.5	137.7	1975	142.1	52.16	14.44
Japan	n.a.	9.9	28.6	37.8	1978	37.8	360.67	21.71
New Zealand	84.6	104.6	116.8	127.4	1975	133.2	48.35	4.83
North America								
Canada	56.9	59.9	74.0	85.5	1974	89.1	55.37	14.02
United States	64.4	57.8	70.2	88.6	1978	88.6	n.a.	27.33
Western Europe								
Austria	41.4	72.8	98.7	100.9	1977	130.1	167.64	11.72
Belgium	118.2	112.0	131.8	125.5	1973	142.5	20.87	-1.60
Denmark	72.0	71.7	108.3	116.89	1976	118.68	89.73	4.61
Finland	42.0	24.8	49.8	54.96	1974	56.2	156.73	9.62
France	21.8	35.4	41.3	45.24	1976	48.66	114.76	14.97
Greece	n.a.	5.5	9.4	21.3	1978	21.3	408.76	123.74
Iceland	n.a.	7.8	13.9	16.0+	1973	16.1	120.86	17.66
Ireland	49.0	50.4	68.7	131.8	1978	131.8	71.81	25.16
Italy	3.4	5.2	11.5	14.9	1978	14.9	402.64	25.12
Netherlands	10.6	23.9	57.4	85.18	1978	85.18	768.86	50.56
Norway	18.2	24.5	36.6	46.0	1978	46.0	163.26	24.66
Portugal	n.a.	4.3	n.a.	33.0	1978	33.0	1561.60	186.91
Spain	2.2	11.0	36.7	47.9	1978	2402.53	44.99	
Sweden	38.2	37.1	57.3	48.9	1975	60.22	64.48	-8.60
Switzerland	43.3	62.6	79.8	68.0	1970	79.8	72.22	-14.82
United Kingdom	85.1	83.8	101.8	121.3	1978	121.3	48.86	19.90
West Germany	34.4	95.0	141.1	150.9	1978	150.9	328.43	4.11

SOURCE: See table 7.

[1] Each year between 1950 (or earliest available year) and 1978 (or latest available year) used in estimating log trend. First years available for Australia, Japan, Greece, Iceland, and Portugal are 1951, 1959, 1955, 1960, and 1962, respectively.

The principal factors which appear to have influenced the trends in alcohol consumption are as follows:

1. An overall trend toward greater consumption of alcoholic beverages, at least partially, for use at meals—namely, wine and beer. This trend is influenced by a long-term increase in per capita income and possibly greater sophistication in food preparation, while the substantial productivity of fermentation technology has enabled the prices of these beverages to remain relatively low.
2. A trend of increased use of alcoholic beverages for purposes of social integration. This trend is related not only to the relatively low cost of alcoholic beverages compared to increased real disposable income, but also to increased requirements for methods of facilitating social integration in industrialized and heterogeneous societies, and to greatly increased leisure time in which socializing can occur (Eisenstadt 1973; Falding 1974).
3. In nearly all countries, increased consumption of nontraditional beverages—e.g., wine in traditional beer- and spirits-drinking

countries and beer in traditional wine-drinking countries. This observation about international consumption trends was made also by Sulkenen (1976), who examined the period of 1950-1970. In considering this trend toward internationalization of consumption patterns, Sulkenen felt that the main tendency was toward the addition of nontraditional beverages to national patterns of consumption (Makela 1975), rather than toward substitution of nontraditional for traditional beverages. With consumption data available through 1978, however, it now appears that there is evidence for significant substitution effects, especially in countries that have traditionally been the highest consumers of wine and among the highest consumers of total alcohol, namely, France, Italy, Portugal, and Spain. For each of these countries, per capita consumption of beer has shown a very substantial long trend increase concomitant with decline or stabilization in wine consumption.

Mechanisms which appear to have led to the tendency toward internationalization of drinking patterns are: first, trade and political interaction among societies (Brenner 1979); and, second, a limit or saturation level for consumption once a country has gotten to a comparatively high level.

Nevertheless, the predominant tendency among Western industrialized societies remains at present that of the addition of nontraditional beverages to the traditional one(s), with the long-term trend toward high consumption overall, except in the countries of highest consumption. Thus, the countries which have shown the steepest and most highly sustained increases in wine consumption are the traditional beer- and spirits-drinking countries, especially the countries of Scandinavia, the British Isles, North America, Australia, and New Zealand.

The principal factors influencing use of alcoholic beverages in a society have been conceptualized in terms of a "supply-demand-stress model" (Brenner 1979) which includes diet, social integration patterns, stress management, and overall availability of alcohol. This model is useful in identifying the impact of long- and short-term economic and social trends on alcohol consumption. The societal trends often cited for their potentially substantial impact on alcohol consumption are growth in disposable income, growth in leisure time (or decline in weekly hours of work), and urbanization or 'modernization.'

Long-term growth in per capita disposable income enables members of some societies to add alcoholic beverages to their diet and to their modes of social integration (Brenner 1975). Income growth is further supplemented by increased leisure time in that it provides added opportunity to use the additional income either for dietary purposes (e.g., the use of restaurants) or social integration (the 'cocktail hour,' or party, or informal gatherings in public and private places).

In the urbanizing or modernizing society (Eisentadt 1973), three additional factors tend to contribute to the growth trends in alcohol consumption. The movement of society from agricultural and folk to urban is traditionally associated with decline in the communal relations based on kinship and ethnic homogeneity. The replacement of communal by economically oriented social ties characteristically raises the question of basic trust and warmth in interpersonal relations (Fallding 1974). The great variety of institutional functions which promote social integration are frequently facilitated by alcoholic beverages (with or without food), which are particularly favored in reduction of interpersonal tensions, anxieties, and hostilities.

The movement toward urban culture also tends to bring with it a cosmopolitanism and sophistication based partly on interaction patterns among members of an occupationally, ethnically, and culturally heterogeneous society. This factor tends to favor the use of alcoholic beverages in societies in which their use had traditionally been minimal in the diet or confined to ritual purposes. Finally, the trend toward secularization in the modern, urban society frequently is related to a decline in the influence of specific moral codes (usually associated with religion) which, in traditional societies, typically restrict the use of alcohol to selected ritual or communal functions.

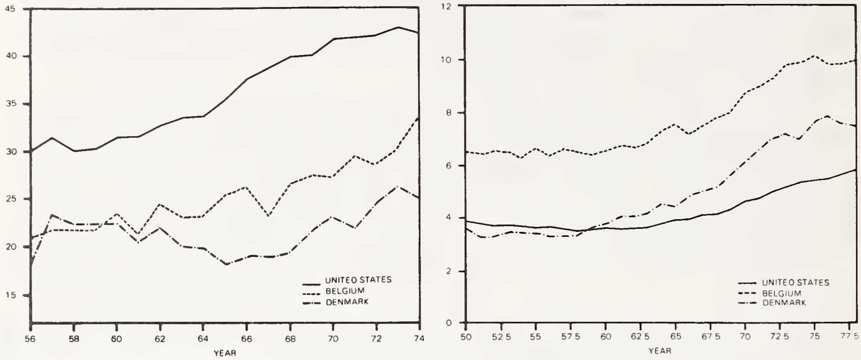
While it has been observed that alcohol consumption per capita generally tends to increase with growth in real per capita income, leisure time, and urbanism, diffusion theory indicates that there are probably saturation levels at which the upward trend ceases (Hamblin et al. 1973). Further diffusion formulations would suggest that, under conditions of growth in commercial and political contact among nations, an international pattern of consumption, both by type of beverage and for overall levels of alcohol consumed, would emerge (Levy 1966).

Among the important short-term factors that might influence fluctuations in alcohol consumption are income and price changes, and stress associated with adverse economic circumstances (Brenner 1975). Also, the short- to intermediate-term importance of the mass media in influencing cultural change is now increasingly recognized (Larsen 1966). Principal factors involved are the roles of industry advertising and marketing, preventive health education, and the reporting of scientific research findings on the impact of alcohol on various pathological conditions.

Trends in Alcohol Consumption in Comparison With Cirrhosis of the Liver Mortality Trends

In order to compare the trends and levels of cirrhosis mortality rates with those in alcohol consumption by beverage type, graphs have been developed for selected countries (figures 1-4). Countries selected were initially grouped according to their overall levels of cirrhosis of liver mortality rates (in order to include them on the same graphs). Graphs of alcohol consumption trends were made to follow the same country groupings as in cirrhosis mortality in order to facilitate comparison.

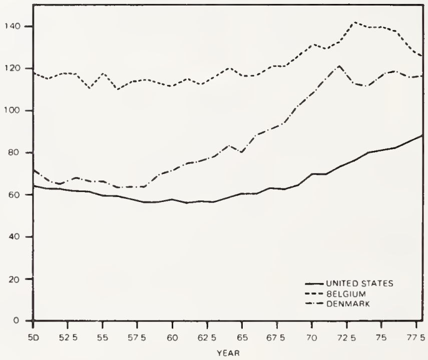
Figure 1. Mortality/Consumption Trends for the United States, Belgium, and Denmark

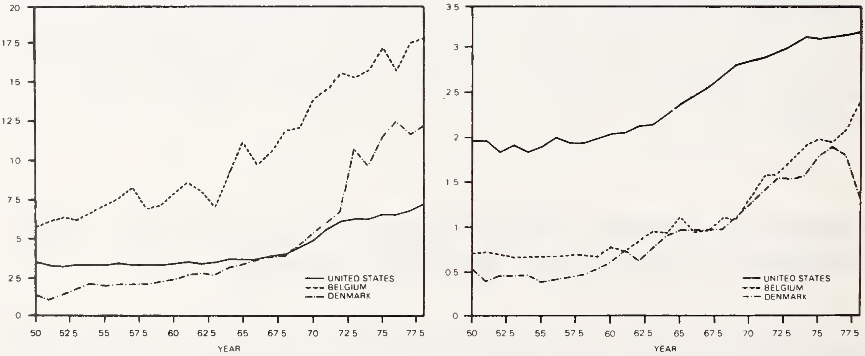


a. Cirrhosis Mortality per 100,000 Population

b. Total Alcohol Consumption, in Liters Per Capita

c. Beer Consumption, in Liters Per Capita

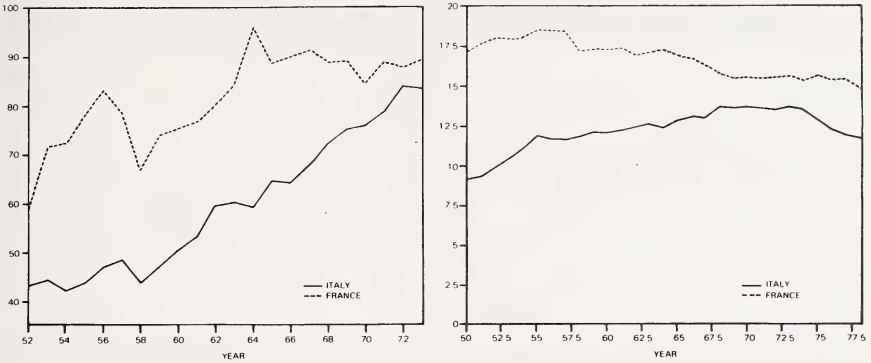




d. Wine Consumption, in Liters Per Capita

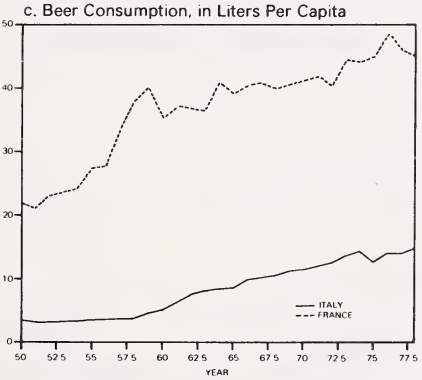
e. Spirits Consumption, in Proof Liters Per Capita

Figure 2. Mortality/Consumption Trends for Italy and France

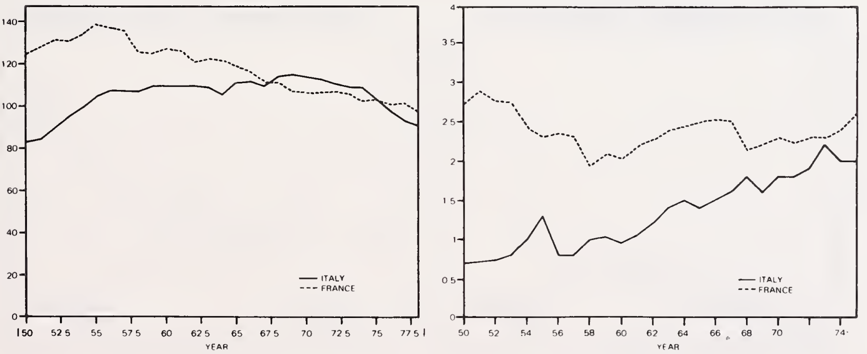


a. Cirrhosis Mortality per 100,000 Population

b. Total Alcohol Consumption, in Liters Per Capita



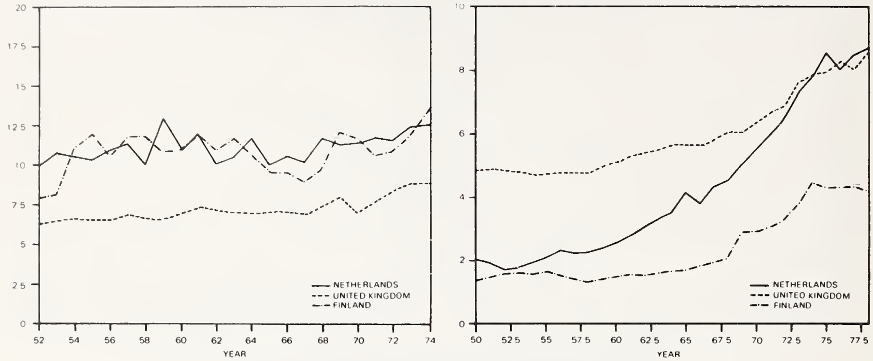
c. Beer Consumption, in Liters Per Capita



d. Wine Consumption, in Liters Per Capita

e. Spirits Consumption, in Proof Liters Per Capita

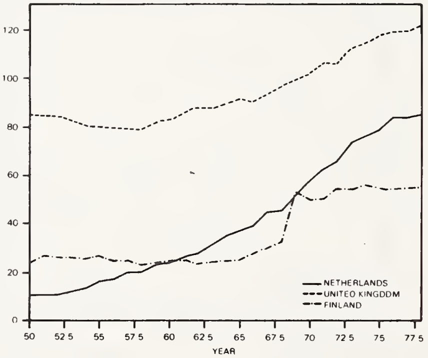
Figure 3. Mortality/Consumption Trends for the Netherlands, the United Kingdom, and Finland



a. Cirrhosis Mortality per 100,000 Population

b. Total Alcohol Consumption, in Liters Per Capita

c. Beer Consumption, in Liters Per Capita



d. Wine Consumption, in Liters Per Capita

e. Spirits Consumption, in Proof Liters Per Capita

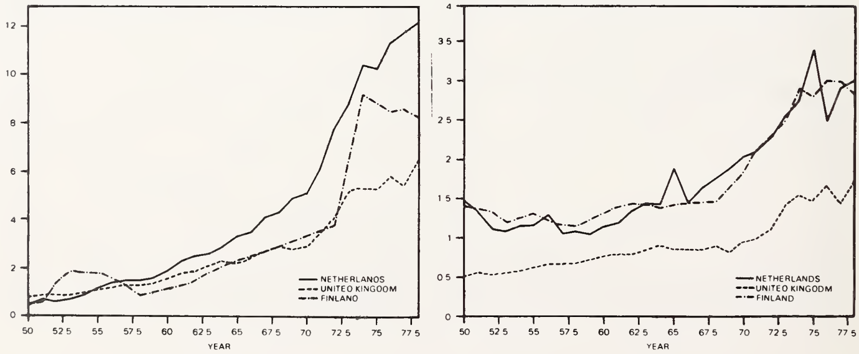
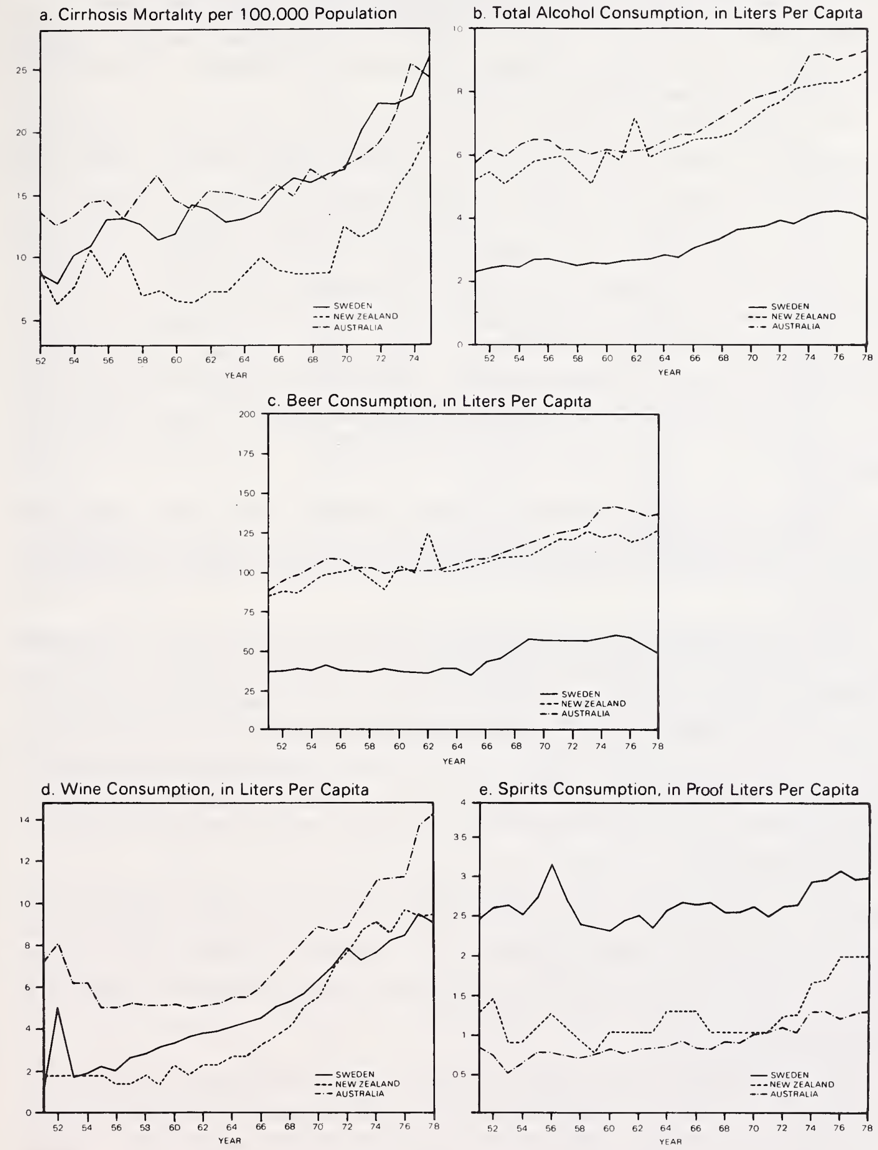


Figure 4. Mortality/Consumption Trends for Sweden, New Zealand, and Australia



In general, it can be observed that the countries of the very highest per capita wine consumption (as well as overall alcohol consumption) show the highest cirrhosis mortality rates, while those of relatively low wine consumption tend to show the lowest rates (see tables 1, 2, 6). Once the main differences in rates of cirrhosis mortality are attributed to per capita wine consumption, spirits consumption appears to become the second most important factor (especially in conjunction with wine consumption) (table 3). With respect to the *trends* since 1950 in cirrhosis mortality, the dominant influence in Western industrialized countries has been spirits consumption.

The United States, Belgium, and Denmark, as seen in figure 1a, show moderate to low cirrhosis rates, but with the United States clearly and consistently higher than Belgium and Denmark. There is, among these countries, a moderate level of overall consumption, heavily dominated by beer (figures 1b, 1c). While total alcohol consumption, and wine particularly, discriminates a high cirrhosis mortality rate from one that is moderate or low, total alcohol consumption does not allow discrimination among the three countries. In fact, total alcohol consumption, dominated by beer in these countries, shows the opposite effect (figures 1b, 1c). Even wine shows a pattern somewhat similar to beer, but it is a small fraction of the total alcohol consumption in the three countries (table 5).

Spirits consumption shows the basic pattern that nearly replicates the cirrhosis graph (figure 1e). And higher wine consumption in Belgium places that country at a rate of cirrhosis consistently higher than that of Denmark.

Italy and France are among the countries of the highest cirrhosis mortality rate in the world, largely due to high consumption of wine in the regular diet, and thus, a high total alcohol consumption. However, wine consumption per capita shows a downward trend in France and a stable trend in Italy (figure 2d), while cirrhosis shows a stabilized trend in France (especially since 1962) and a sharp upward trend in Italy (figure 2a). Indeed, at the end of the period, cirrhosis levels are similar between the two countries.

For both countries, beer consumption shows an upward trend, with France considerably and consistently higher than Italy, a situation which bears only a slight resemblance to the cirrhosis mortality rate graphs (figure 2c). Spirits consumption, however, shows trends and levels that closely approximate those of cirrhosis mortality rates in the two countries (figure 2e).

The Netherlands, the United Kingdom, and Finland are countries with relatively low cirrhosis mortality rates by international standards. These countries are among the lowest consumers of wine per capita. Throughout the 1950 to 1978 period, the Dutch and Finnish rates have been very close to each other and significantly above those of the United Kingdom (figure 3a).

Per capita, overall alcohol consumption rates are not at all reflected in the cirrhosis mortality data. Finland has shown the lowest consumption, and the United Kingdom the highest; the Netherlands begins by resembling Finland and ends by reaching the level of the United Kingdom rates (figure 3b). This total alcohol consumption picture is largely a function of beer consumption and reflects slightly wine consumption (figures 3c, 3d). However, only the trends in spirits consumption bear a relation to those in cirrhosis mortality rates for the three countries (figure 3e).

Table 5. Apparent Consumption of Total Alcohol in Liters Per Capita and Fractions Consumed by Beverage Type in Western Industrialized Countries, 1950-1978

Australasia				
Australia	199.	.127	.800	.073
Japan	24.	.015	.570	.414
New Zealand	185	.078	.815	.107
North America				
Canada	174.	.085	.575	.340
United States	122.	.135	.627	.239
Western Europe				
Austria	225.	.280	.522	.098
Belgium	226.	.163	.692	.145
Denmark	144.	.137	.781	.082
France	487.	.786	.090	.142
Iceland	49.	.094	.096	.810
Ireland	140.	.060	.700	.240
Italy	.365	.852	.034	.114
Netherlands	125.	.122	.474	.404
Norway	65.	.116	.616	.268
Portugal	.196.	.877	.069	.055
Spain	175.	.764	.135	.101
Sweden	88.	.210	.450	.340
Switzerland	256.	.474	.350	.176
United Kingdom	173.	.054	.792	.154
West Germany	235.	.193	.533	.274

SOURCE: See Table 7.

Sweden, Australia, and New Zealand have had moderately low cirrhosis mortality rates compared with those of other industrialized countries. This is largely accounted for by comparatively low overall per capita alcohol consumption and especially a low level of wine consumption. When comparing the trends in cirrhosis mortality rates for the three countries (figure 4a), however, one observes that they do not correspond to total alcohol consumption trends (figure 4b), which virtually replicate those for beer consumption (figure 4c). Rather, it is clear that the trend differentials in cirrhosis mortality rates, showing New Zealand with consistently lower rates, largely reflect high spirits consumption and growing wine consumption in Sweden (figure 4d), on the one hand, and comparatively (among these countries) high wine consumption for Australia, on the other hand (figure 4e).

In summary, basic international levels of cirrhosis mortality rates are largely based on wine consumption. This is only partly due to the fact that the very high wine-consuming countries are also those with the higher total consumption rates. In the vast majority of countries where wine is not the main alcoholic beverage, beer tends to be. Especially where beer is the main source of alcohol consumption, total alcohol consumption becomes a poor predictor of cirrhosis mortality. A combination of wine and spirits results in very high—in fact, the highest recorded—cirrhosis mortality rates. A combination of beer and spirits results in a moderate cirrhosis mortality level. However, beer alone results in a very low level of cirrhosis mortality, perhaps because of its relatively low alcohol content; spirits alone results in a very low level as well, partly because of a very low consumption level.

The international data on *trends* in alcohol consumption, by beverage type, and cirrhosis mortality rates clearly bear out this conclusion. Thus, since the trends in wine consumption in the major wine-producing

Table 6. Cirrhosis of Liver Mortality Rates for Ages 45 and Over, Age Adjusted in Western Industrialized Countries

					Latest Available		Percentage Change Based on Log Trend[1]	
Country	1952	1960	1970	1974	Year	Value		
Australasia								
Australia	13.8221	14.7174	17.2582	25.5846	1977	24.4549	76.990	50.375
Japan	32.4921	45.4142	41.8337	41.6128	1976	39.6929	11.768	-1.869
New Zealand	8.91545	6.52261	12.4873	17.2694	1976	15.9231	94.655	53.824
North America								
Canada	15.2108	20.8760	27.1066	36.6422	1975	37.0613	127.965	40.725
United States	38.6083	31.4542	41.6278	42.3024	1976	38.6863	55.897	-6.256
Western Europe								
Austria		55.2597	67.6278	n.a.	1972	67.7279	108.230	0.160
Belgium	n.a.	23.4237	27.2862	33.4290	1975	32.3954	62.909	20.671
Denmark	17.8432	22.4048	22.9354	25.0195	1975	24.9883	30.164	13.320
England & Wales	6.02285	6.59313	6.58966	8.12447	1974	8.12447	30.432	24.234
Finland	7.95137	10.9277	11.7320	13.4162	1975	14.9392	28.677	30.563
France	58.9283	75.3944	84.4110	85.5014	1975	87.9464	82.52	1.640
Greece	n.a.	34.2586	41.7494	34.1470	1976	32.7286	-5.342	-25.971
Iceland	n.a.	5.90485	8.39733[2]	12.8418	1976	0.000		
Ireland	5.72184	5.18062	8.74580	10.3331	1974	10.331	75.886	23.284
Italy	43.2157	50.4246	75.9005	81.6958	1974	81.6958	102.404	10.989
Netherlands	10.0076	11.1075	11.4308	12.5838	1976	13.4427	19.547	17.412
North Ireland	7.25249	6.53083	7.53406	11.8345	1977	II.9297	66.315	69.916
Norway	9.04885	10.9349	9.88282	9.67949	1977	10.0200	15.087	21.180
Portugal	67.3092	65.5593	77.3199	85.9232	1975	95.5788	20.332	7.452
Scotland	8.65884	10.9462	11.2928	15.5426	1975	14.1104	42.848	38.604
Spain	n.a.	48.5129	60.8444	63.9444	1975	64.6215	72.008	4.089
Sweden	8.67766	11.8848	17.0420	22.9053	1975	25.8065	161.213	43.685
Switzerland	34.0330	32.8755	40.6835	38.4704	1977	43.1914	-10.177	-25.016
West Germany	24.9261	46.3888	55.8252	60.4185	1975	60.4185	137.857	10.228

SOURCE: See Table 7.

[1] Each year between 1952 (or earliest available year) and 1974 (or latest available year) use in estimating log trend. First years available for Austria, Greece, and Spain are 1953, 1958, and 1954, respectively.

[2] 1971.

countries have either fallen or remained stable since 1950, spirits has tended to be the major source of the increased trend of cirrhosis mortality in those countries. Moreover, while beer consumption in primarily beer- and spirits-drinking countries has generally increased since 1950, that trend does not appear to be related to cirrhosis mortality trends. It is primarily spirits consumption in these countries (since wine consumption has not increased to levels comparable with spirits) that again appears to have influenced the *trend* in cirrhosis mortality since 1950.

Analysis of Alcohol-Related Pathologies in Comparison With Alcohol Consumption

The best known formulations of the association between alcohol consumption and pathology are inadequate in international comparisons because (a) varying societal functions of drinking are found in different societies (diet, social integration, stress relief) and, thus, different potential for very heavy consumption or for addiction; (b) different national populations vary as to homogeneity of their alcohol-consuming subpopulations; and (c) a variety of risk factors, other than alcohol consumption, influences alcohol-related morbidity and mortality. The influences of these risk factors must be brought under statistical control so that one can estimate the (partial) relation between alcohol consumption and these pathological states.

These methodological problems are most serious when they concern analysis of alcohol-related malignancies, suicide, homicide, or accidents in which the causal importance of alcohol consumption may not be paramount. These problems are even present in the international comparison of cirrhosis of the liver mortality rates among industrialized countries.

The Ledermann formulation (1964) argues that alcohol consumption is log-normally distributed in homogeneous populations and that a constant relation exists between per capita consumption and the prevalence of alcohol-related pathologies. While this view has met with some methodological criticism (Miller and Agnew 1974), its proponents generally believe that the overall consumption of total ethanol per capita in a population is a reasonable indication of alcohol-based pathologies. Jellinek (Popham 1956) and those who have modified his basic formulation (Brenner 1960) point to alcohol-related pathology—especially statistical derivations of cirrhosis of the liver mortality rates—as an appropriate indicator of alcoholism.

Both formulations may be partially correct if one is interested in explaining the occurrence of alcohol-related pathologies within national populations. The Ledermann formulation is partially correct within countries because patterns of drinking are usually similar throughout a country which has a homogeneous *tradition* governing the appropriate functions of alcohol with respect to each beverage type. The Jellinek procedure is also partially correctly applied within countries for a similar reason—namely, a homogeneous tradition with respect to the relation of alcohol use, by specific beverage, to the various types of alcohol addiction.

However, when comparison is made *among* countries, the underlying principles of the Ledermann and Jellinek formulations are in conflict. The former insists that total alcohol consumption, the latter that consumption by alcoholics, provides appropriate predictions of alcohol-related pathology—especially cirrhosis of the liver mortality. Further, in international comparisons, the Jellinek method is at least partly incorrect because heavy alcohol consumption (and especially wine consumption) associated with meals, but not necessarily alcoholism in the sense employed by Jellinek, becomes the dominant issue. The Ledermann procedure is also partly incorrect in comparisons of countries of similar total alcohol (or even wine) consumption levels; in that instance, spirits, which is more typically associated with uncontrolled *addiction* (Straus 1971), is frequently the key. Nonetheless, principles derived from both the Ledermann and the Jellinek formulations may be correctly used *interactively* because *both* heavy consumption per capita and addiction may be necessary in a thorough explanation of international variation in alcohol-related pathologies.

The cirrhosis mortality rate in international comparisons is, thus, partly an indicator of addictive alcohol consumption and partly one of high overall consumption—especially of wine. One might expect, then, that the types of alcohol consumption most closely related to cirrhosis mortality would also be associated with controlled, rather than uncontrolled, alcohol addiction. 'Controlled' addiction refers to the type prevalent in countries of heavy wine consumption associated with meals, such as France, Italy, Spain, and Portugal. In these countries of Latin-Mediterranean tradition, while the overall heavy wine consumption contributes to dependency, it appears that it militates against 'occasionally excessive' (Jellinek 1960; Sadoun et al 1965) drinking and intoxication.

The type of alcohol addiction that is more prevalent in societies of Anglo-Saxon and Scandinavian origin, or Germanic (linguistic) tradition, generally involves steady excessive symptomatic drinking which becomes uncontrollable and progressively destructive of the psychological, social, and ultimately physiological functioning of the individual (Straus 1971). In many countries, the early symptoms of such addiction usually involve serious mental disorder. This type of addiction is less prevalent in countries where alcohol is used almost exclusively at meals or only for ritual purposes (Jellinek 1960; Sadoun et al. 1965; Straus 1971). In the Germanic tradition, for example, neither beer (the dominant source of alcohol) nor wine, traditionally used only in the German-speaking areas, is exclusively a meal beverage.

In addition to uncontrolled alcohol addiction, a significant problem in countries where alcohol is not basically a meal or ritual beverage is in episodically excessive drinking and, especially, intoxication. The important class of pathologies which may result from such consumption includes disorders of mood, such as depression and violence, occasionally involving suicide or homicide. Disorders of judgment and intellectual functioning and sensory-motor coordination are also frequent results, especially among youth inexperienced with alcohol. Such disorders raise the risks of industrial, home, and automobile accidents and fatalities.

It is important to bear in mind that the hypothetical probabilities of pathology associated with the consumption of types of beverages are typically given for entire populations, rather than for individuals. Presumably, on an individual basis, it is possible for any single beverage, or combination of beverages, to be a significant cause or factor in any one of the alcohol-related pathologies. Also, each of the pathologies is, as is well documented, multicausal in nature. Thus, while in some countries alcohol consumption may be a prominent cause of any one of these pathologies, in other countries its effect may be negligible or absent for the same pathologies.

The impact on a population of the consumption of any alcoholic beverage depends on how the beverage is ordinarily used in the society. The impact on pathology of absolute ethanol, regardless of the specific beverage in which it is found, may well be similar from one society to another. However, the utility of the beverage as an aid in nutrition, social integration, or stress relief will determine the likelihood of its being used to excess. Thus, it is more likely that spirits, because of its high alcohol content, will be used for stress relief and by the uncontrolled addict. It is likely that wine and, less commonly, beer will be used by the controlled addict and the nonaddicted alcoholic (Straus 1971).

There is also substantial evidence which implicates heavy alcohol consumption in several malignancies, especially involving the mouth, pharynx, larynx, and esophagus (Lowenfels 1979; U.S. Department of Health, Education, and Welfare 1978). The risk of such alcohol-related malignancies rises substantially with cigarette smoking. The connection of alcohol consumption to malignancies of the remainder of the digestive system is, as yet, not well established. Recent research points to the possibility of alcohol involvement in cancers of the large intestine and rectum (Lowenfels 1979; U.S. Department of Health, Education. and Welfare 1978). In any case, the research linking alcohol to malignancy is not sufficiently developed to be further identified with specific beverages, particularly since the pathophysiological mechanisms are not well understood.

Trends in pathologies associated with alcohol, or potentially associated with it, all appear to show increases or relative stability (World Health Organization 1953-1979), in contrast to the trend in mortality generally, which is downward in nearly all industrialized countries.

Table 7. Data Sources

Population Data: 1950-1976[1]

United States	*Demographic Yearbook,* United Nations
Canada	1950-1970: *Canada Yearbook,* Statistics Canada 1971-1976: *Demographic Yearbook*
England & Wales	1950-1974: *Demographic Yearbook* 1975-1977: *Annual Abstract of Statistics,* Her Majesty's Stationery Office
France	*Annuaire Statistique de la France,* Institut National de la Statistique et des Etudes Economiques
Italy	*Annuario Statistico Italiano,* Istituto Centrale di Statistica Netherlands
Spain	*World Health Statistics Annual,* World Health Organization
West Germany	*Statistisches Jahrbuch fur die Bundesrepublik Deutschland,* Statistisches Bundesamt
Austria	*World Health Statistics Annual*
Belgium	*Demographic Yearbook*
Denmark	*World Health Statistics Annual*
Ireland	*Demographic Yearbook*
Northern Ireland	*World Health Statistics Annual*
Scotland	*World Health Statistics Annual*
Switzerland	1950-1971: *Demographic Yearbook* 1972-1973: *Statistisches Jahrbuch der Schweiz,* Atatistisches Amt
Japan	*Demographic Yearbook*
Finland	*World Health Statistics Annual*
Greece	*World Health Statistics Annual*
Iceland	*Demographic Yearbook*
Norway	*World Health Statistics Annual*
Portugal	*World Health Statistics Annual*
Australia	*World Health Statistics Annual*
New Zealand	*World Health Statistics Annual*

Total Mortality Data: 1951-1976

United States	*Vital Statistics of the United States,* U.S. Department of Health, Education, and Welfare
All other countries	*World Health Statistics Annual*

Age-Specific Mortality Data: 1951-1976

All countries	*World Health Statistics Annual*

Alcohol Consumption Data: 1950-1978

All countries	1950-1972: *International Statistics on Alcoholic Beverages, 1950-1972,* Finnish Foundation for Alcohol Studies 1973-1978: *Hoeveel alcoholhoudende dranken worden er in de wereld gedronken?,* 1979, Produktschap voor Gedistelleerde Dranken

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[1] Years indicated refer to the data available that were collected from annual volumes. Publication years have not been indicated as they vary by country.

A comparison of the international mortality rates with data for alcohol consumption shows that it is not easy to predict the alcohol-related pathologies by country—either in rates at a point of time or in trend form—from per capita alcohol consumption. Further, it is clear from the international mortality data that the rates and trends of the different causes of alcohol-related mortality are not closely related to one another by country. The reasons for this probably have less to do with the functions of different alcoholic beverages in the countries than with the existence of other risk factors which, in addition to or in interaction with alcohol, also influence the occurrence of each of these pathologies. Such factors include poor nutrition, general ill health including mental health, social disorganization, and inadequate medical care.

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Chapter 5

Estimating Alcohol Involvement in Serious Events

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Abstract

In this chapter, the estimates of alcohol's presence across casualty areas (traffic and nontraffic accidents, crime, and suicide) are updated with studies that have come into the literature since 1976. Several different methods of calculating alcohol presence in these areas are described. It is contended that the study of alcohol's role in serious events is, for the most part, a very weak area of scientific inquiry, theoretically and methodologically. Yet, within this area there are more and less reliable methods of estimating the role and presence of alcohol in the chain of events surrounding these casualties. The following three types of estimates are argued for: (1) Range estimates narrowed to reflect the ranges of the middle half of all estimates; (2) Estimates based on the best designed studies in each casualty area even if these studies are deficient in themselves; and (3) Where relevant, estimates based on control studies. Included under the heading of new directions for research are problems in area of (1) Motorcycle accidents nad fatalities; (2) The causal chain and traffic accidents; (3) Special populations, (4) Perceptions of the role of alcohol in serious events; (5) Locus of alcohol-related violence; and (6) Drugs and alcohol. It is concluded that, as an area of scientific inquiry, the study of alcohol's role in these serious events will progress only if investigators attempt to build on the best knowledge available.

Introduction

Between a third and a half of adult Americans involved in accidents, crimes, and suicides had been drinking alcohol prior to the event. The specific role of alcohol in the circumstances leading to these serious, often violent, events is not known. What has been established is that alcohol is present in these events in a sufficiently large proportion of cases to warrant closer investigation. A recent study of violent deaths in New York City (Haberman and Baden 1978) shows a very high level of

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alcohol presence in serious events of different types. For example, 32 percent of suicides, 42 percent of homicides, and 68 percent of drownings had positive blood alcohol content (BAC) levels (table 5).

Apart from the overall high level of positive BAC across casualty types, what is noteworthy is the substantial proportion of those drinking who were intoxicated. Eighty-five percent of victims of falls, 85 percent of victims of fires, and 64 percent of homicide victims were intoxicated (BAC-.10) at the time of death. This study also confirms the high level of alcohol problems found in the life histories of victims of violent death (table 6).

Assessing alcohol's role in serious events has proved difficult. Most research on alcohol's role in these events (other than research on traffic accidents) has shown only the association of some aspect of alcohol with some type of serious event. Empirical evidence has been cited to support the case that "half of all traffic fatalities are alcohol related. . .that alcohol use is associated with up to 69 percent of drownings. . .that alcohol has been found to be involved in up to 70 percent of all deaths from falls. . .that as many as 83 percent of offenders in prison have reported alcohol involvement in their crimes" (U.S. Department of Health, Education, and Welfare 1978).

At the same time critics of these estimates have argued that many studies of alcohol involvement in these "serious events" do not have appropriate control groups, are poorly designed, are atheoretical, assume a causal role for alcohol when it is found to be present, do not use well-defined measures of either the independent or the dependent variables, and do not attend to the context or situation in which the event occurs (Aarens et al. 1977; Pernanen 1976).

The same studies are cited by those who want to "enhance" alcohol's role in serious events and by the studies' critics who want to minimize its role. The fact that the same studies can be used either to enhance or to minimize and question alcohol involvement is primarily because most of the research in these areas does not, and in some cases cannot, conform to the standards of the epidemiological tradition in which it is rooted.

In particular, it has been difficult to define appropriate control groups for events that are sudden, violent, and in many cases improbable.

Recent reviews of the literature on the role of alcohol in serious events organize the empirical findings into three major types of studies: (1) alcohol use at the time of the serious event, (2) drinking history and drinking problems of persons in the serious events, and (3) the proportion of alcoholics who experience serious events (Aarens et al. 1977; Roizen in press).

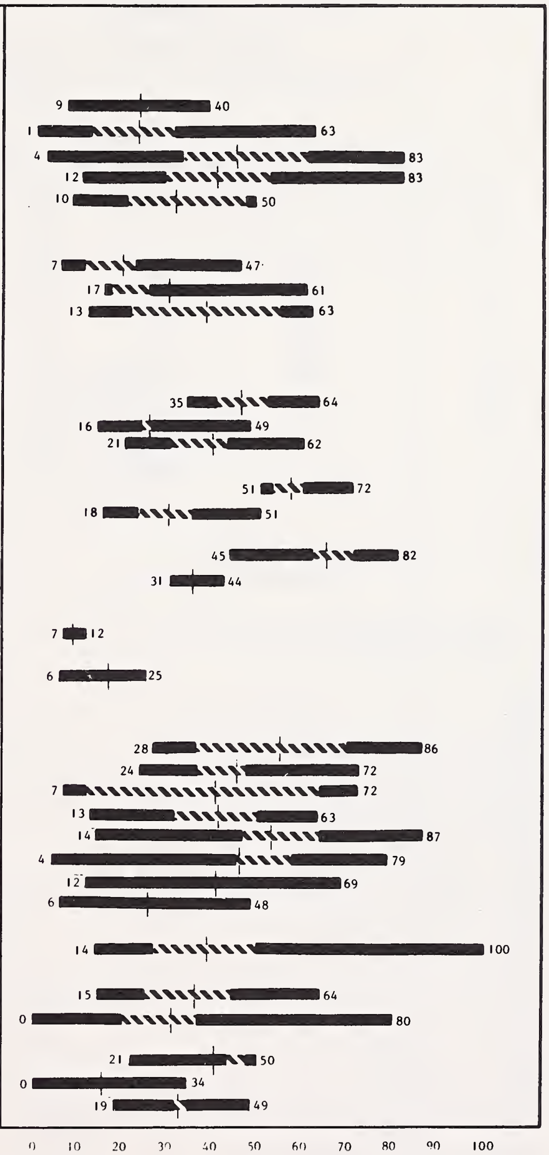
The data graphically represented in figures 1, 2, 3, and 4 draw on empirical studies conducted in industrialized countries, particularly in the United States. They show the wide variation in estimates found in these three types of studies. Some of this variation is due to the methodological and reporting problems found in these studies, including variation in the definition of casualty events, variation in sample parameters, and problems in alcohol reporting.

Figure 1. Findings of Studies of Alcohol Involvement in Serious Accidents and Crimes[1]

STUDIES

CASUALTY	No. of Studies
Accidents (Nontraffic)	
Fatal	
Industry	2
Aviation	17
Drowning	19
Fire/Burns	15
Falls	7
Nonfatal	
Industry	13
Fire/Burns	4
Falls	5
Traffic Accidents	
Fatal	
Drivers	26
Passengers	7
Pedestrians	20
Drivers:	
Single-vehicle	17
Multi-vehicle	12
Responsible	
All fatal accidents	7
Multi-vehicle fatal accidents	2
Nonresponsible	3
Nonfatal	
Drivers	3
Crime	
Arrested Populations	
Homicide Offenders	14
Assault Offenders	8
Robbery Offenders	5
Sex Offenders	7
Homicide Victims	28
Assault Victims	11
Robbery Victims	4
Sex Victims	4
Prison Populations	
Offenders	27
Suicide	
Attempters	15
Completers	20
Family Abuse	
Marital Violence	7
Child Abusers/Neglecters	3
Child Molesters	8

RANGE OF PERCENTAGES



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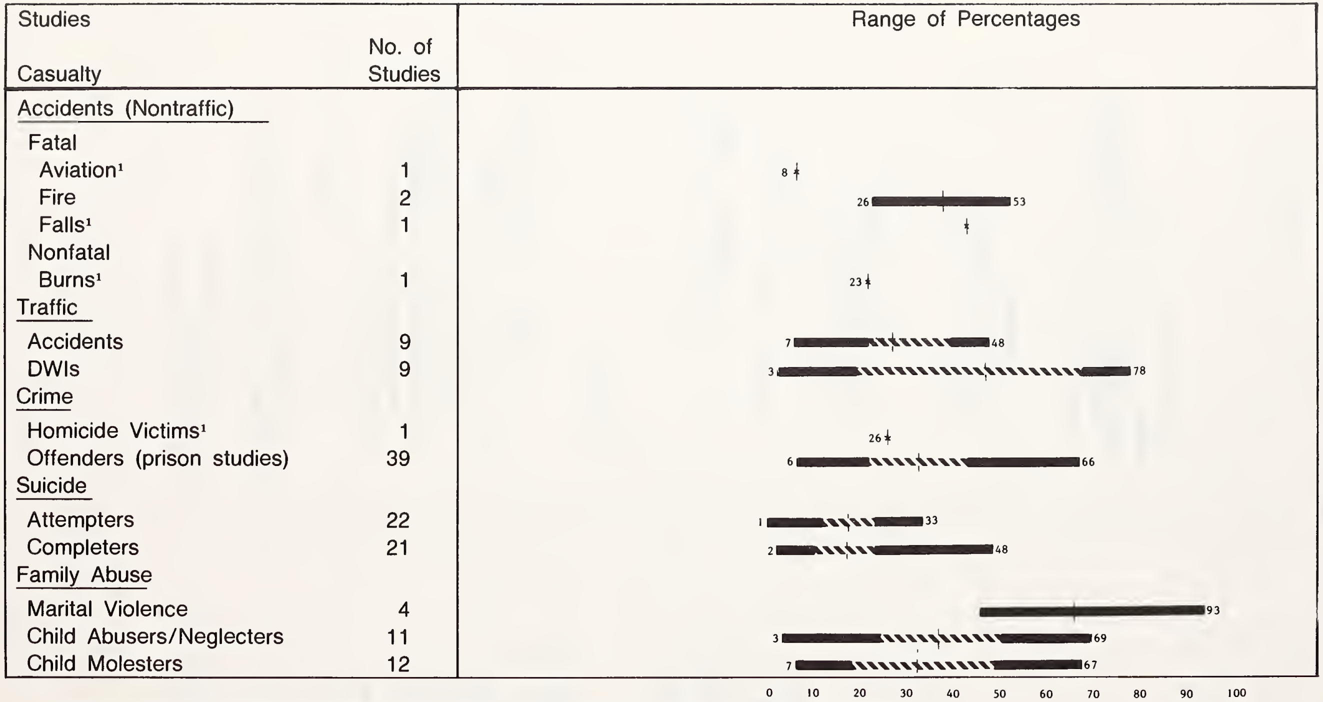
[1] Studies use measures such as BACs, police reports of drinking, witness reports, self reports.

Figure 2. Findings of Studies Reporting the Proportion of Heavy Drinkers or Alcoholics Involved in Serious Accidents and Crimes



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[1] Studies include alcoholics, problem drinkers and high qualtity/frequency users of alcohol.

Figure 3. Findings of Studies Reporting the Involvement of Labeled Alcoholics in Crimes and Nonfatal, Serious Accidents

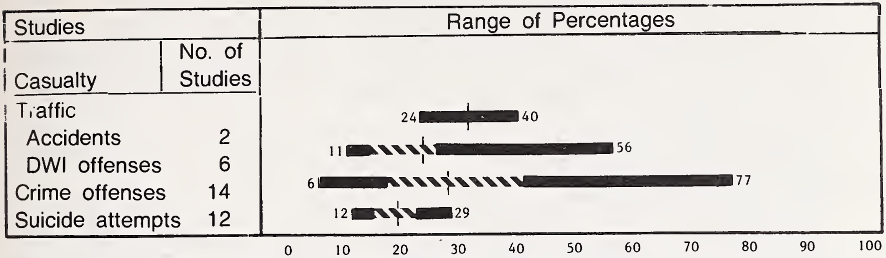
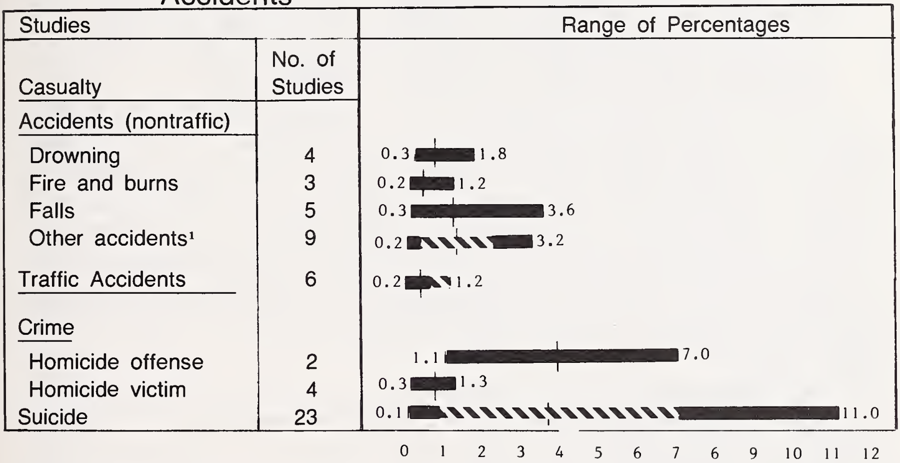


Figure 4. Findings of Studies Reporting the Involvement of Labeled Alcoholics in Crimes and Fatal, Serious Accidents



¹ Includes, in different studies, accidents of different types.

Taking the full range (as given by each bar) in figure 1, we see that in many cases the full range spans from less than 15 or 20 percent to more than 60 percent. In several cases, the range extends to nearly 90 percent.

The problem in estimating the amount and kind of alcohol involvement in serious events arises from the fact that the range of estimates in these event-based studies is as great as it is. The scientific norms surrounding this research would suggest that only the "best" studies—"best" theoretically and methodologically—ought to be used in estimating alcohol involvement. However, this is an area of keen social interest, relevant to current issues of policy, in which there are few "good" studies. Alcohol's role in serious events is new research territory. Few studies, outside those on traffic accidents, are purposively designed to examine alcohol's role in the behavioral chain leading to injury or death. Yet, increasingly, assessments of economic costs of alcohol problems and justifications for costly prevention and treatment programs rest on the kinds of estimates given in these studies. Many examples are to be found. Reed (in press) argues, for example, "Information about drinking and driving presented to policymakers typically has expressed the importance of the problem in terms of costs associated with it. . ..the *Third Special Report on Alcohol and Health* noted that "approximately one-third of the. . .injuries and one-half of the fatalities (from traffic accidents) are alcohol-related' (U.S. Department of Health, Education, and Welfare 1978)."

The following statement links this argument to a more general problem in scientific inquiry.

> The pitfalls to be encountered in connection with evidence are most noticeable when existing information is taken over for use in a problem. Whether this material is immediately capable of adequate strength and fit for its function in the argument, will depend on the mode of its original production. For when it is cited, the argument by which it was derived is implicitly included in the argument of the new problem, as a subsidiary argument for its adequacy. (Ravetz 1971)

There are few studies of alcohol's role in serious events which were designed to test theoretically specific propositions. In most cases, research is used post hoc to bolster debate. The accumulation of studies showing alcohol *presence* in casualties, no matter what their number or geographical and temporal distribution, does not demonstrate that alcohol is causally involved. What these studies do show, however, is that substantial alcohol presence is something that must be explained in order to unravel the complex causal nexus surrounding these events.

In the summer of 1976, the Social Research Group at the University of California, Berkeley, undertook a large-scale review of the literature on alcohol involvement in casualties and crime for the National Institute on Alcohol Abuse and Alcoholism. Five areas of investigation were chosen regarding the role of alcohol in: traffic accidents, other accidents, suicide, family violence, and crime. This paper updates the earlier work to include new empirical studies in the five areas published between the summer of 1976 and the winter of 1979. We will raise again the problems in estimating alcohol's involvement in serious events, and critically question the utility of several different types of estimates.

The earlier research effort, as this one, focused on research on events rather than on individual actors. By *serious events* we mean events which actually or potentially result in loss of life, injury, or substantial property loss. Status offenses, aggression which did not result in injury or arrest (e.g., aggression displayed in a laboratory setting), and "near misses" were not included in the earlier work and are not included in this work. The event itself is the point at which investigation begins—working back to characteristics (including drinking problems) of individuals involved in serious events. This focus gives the context of events as much weight as the persons involved in the events. And alcohol, in this view, is as much an attribute of events as of people. The study of events has not been a strong research tradition in the study of alcohol problems.

Room (1978) notes:

> To focus on events rather than conditions runs somewhat against the tides which have dominated the alcohol literature in the last 35 years, particularly in North America. The focus in that literature on alcoholism as a chronic disease has turned attention toward long-term processes, and away from what are often viewed as mere incidents. Where serious events have been covered in the alcoholism literature, they have often been seen simply as symptoms of some underlying condition.

Reviewing the work on alcohol involvement in serious events requires that the investigator hold two somewhat incompatible perspectives toward the research effort: first, that the studies of serious events are useful pieces of data in their own right: that is, they are worthy of review and important scientifically and as cultural artifacts; second, that most of the studies represent a claim that alcohol is responsible for the occurrence of these events—a claim not always, or even usually, well established in the data. The first perspective leads us to accept the findings in the various studies subject to their meeting some minimum requirements of scholarly work. (Stringent requirements would reduce the number of really useful studies to a handful.) The second perspective toward the work leads us to wariness lest too much is attributed to the alcohol in the event and too little to other aspects of the social and personal context. Studies of serious events have been carried out in a social and research context in which beliefs about alcohol as the "cause" of serious events have determined the questions that are asked and how events are studied.

We argued in the early work that most estimates of alcohol's involvement in serious events—especially one-number estimates—are highly suspect. (By "one-number estimates" we mean estimates like "Half of all traffic fatalities are alcohol-related.") Even studies of a single type of event that are similar in design vary in the *aspect* of alcohol that is used (e.g., self-reported problem drinking, BAC, observation); the proportion of consecutive or sampled cases that yield an alcohol observation; and the attention alcohol is given in the site that is studied (e.g., emergency room, roadside, jail).

Given the state of research on serious events, what is the utility of reviews of studies that estimate alcohol's presence or role in serious events? New studies link themselves to the longer research tradition by selectively citing earlier studies that conform to the research presented either in design or in types of findings. That is, studies are cited selectively as they appear "to work." Comprehensive reviews (Aarens et al. 1977; Pernanen 1976) place studies within the larger tradition. They establish a cumulative body of work which can orient and guide new research. Comprehensive reviews also show the diversity of types of studies, variation in their quality and adequacy, and the full range of estimates of alcohol's presence in serious events. Reviews that include several types of serious events (Aarens et al. 1977) demonstrate also the differences in numbers and types of studies in one casualty area as compared with another (e.g., traffic accidents as compared with child abuse).

Looked at from a cross-national perspective, these reviews show marked differences in research attention given by different societies to each casualty area. Further, reviews such as these indicate which *aspects* of alcohol (e.g., alcoholism as compared with BAC in the event) receive attention in different casualty areas, in different cultures. As an example, the number of studies that measure alcoholism or drinking problems in studies of suicide attempts is large; the number for accidents of various kinds is relatively small. Chronic alcohol problems have received much less attention in explaining accidents than in explaining suicides; acute alcohol *use* has received less attention than alcoholism in explaining suicidal behavior. As this review and our early review show, the relative emphasis on acute versus chronic alcohol problems differs from society to society—both within and across categories of serious events.

In the first section of this report, new studies of serious events are reviewed to update several types of estimates of alcohol's presence in serious events and the alcohol problems of those involved in these events. More attention is given to event-based studies than to studies of labeled alcoholics. This reflects our interest in acute negative consequences of drinking rather than chronic alcohol problems. The overall estimates of alcohol presence and problems in a given casualty area (i.e., type of serious event) are based on the estimates given in individual studies. Using the original studies as "data," we have calculated the ranges of estimates of alcohol presence and problems.

In the second section, a brief look is taken at several particularly well-designed studies. This represents one additional type of estimate of alcohol presence and problems. Most studies cited to support the view that alcohol is involved in casualties and crime have not been purposively designed to test this thesis. The alcohol relationship is most often a secondary agenda to another research agenda. In addition, most of these studies are done in a relatively small geographic area or in a single institution (e.g., jail, hospital, treatment center). While a single "good" study in a casualty area is important in estimating alcohol's role, what is finally necessary is a properly designed study in each casualty area that controls relevant variation, whether the variation is geographic, demographic, or related to the definition of the casualty (e.g., covers the range of types of event within a casualty area—multivehicle, single vehicle, fatal, injury, etc.).

In the third section, a number of control studies in each casualty area are reviewed. This is yet another form of estimation and, like the others, has certain disadvantages. For example, it is doubtful that even a carefully drawn case-control study controls for all the factors other than drinking that might play a part in causing a serious event. It cannot simply be assumed, therefore, that the differences between the event-based and the control sample are due to the effects of alcohol alone.

Yet control studies are the best test of whether claims of alcohol involvement are spurious.

Because this section includes the only analysis of alcohol involvement, casualty by casualty, *new* studies of particular interest are also mentioned whether or not they include appropriate control groups.

The final section of the report points to new directions for research in this area.

Aggregate Estimates of Alcohol Involvement in Serious Events

Although the literature on these events does not always neatly divide into studies with a focus on events and studies with a focus on persons, in general we found that most research falls within one of three types:

Type I studies: Studies of populations of serious events, measuring the presence or absence of *alcohol in the event*

Type II studies: Studies of populations of serious events, measuring the *drinking history or status of persons involved in the event*

Type III studies: Studies of populations of alcoholics or heavy or problem drinkers, measuring the occurrence of serious events over some time period in the populations.

The five areas of study—traffic accidents, non-traffic-related accidents, crime, suicide, and family violence—have been subdivided further where the number of studies warranted a new category. In some cases, a subdivision was created because it appeared to be an important area for future research, e.g., falls. The number of studies in each casualty area is shown in tables 1, 2, and 3.

As the column in the table headed "Number of Studies" shows, different casualty areas have received differing amounts of research attention. Studies of prison populations and homicide victims are numerous; studies of family violence, although increasing, are relatively few in number. In some areas, the number of studies reflects a long tradition of research: several serious studies of drinking and criminal behavior were carried out in the first half of the last century. In other areas (e.g., the study of traffic accidents), the number of studies reflects relatively recent social concern. Most studies of traffic accidents have been done in the last 20 years, yet the number of studies of traffic accidents is far greater worldwide than of any other casualty area. (We have been highly selective on the area of road research—taking only North American studies and selecting, even among these, those that were methodologically most adequate or were of a particular type that we were looking for, e.g., studies of "responsible" drivers.)

Table 1. Type I Studies: Alcohol in the Event

Casualty	No. of Studies Total	New[1]	Range	Interquartile Range
Accidents (Nontraffic)				
Fatal				
Industry	2	(0)	9-40	—
Aviation	17	(5)	1-63	14-32
Drowning	19	(4)	4-83	34-62
Fire	15	(3)	12-83	30-54
Falls	7	(3)	10-50	21-48
Nonfatal				
Industry	13	(-)	7-47	12-23
Burns	4	(1)	17-61	—
Falls	5	(-)	13-63	23-56
Traffic Accidents				
Fatal				
Drivers	26	(3)	35-64	42-53
Passengers	7	(2)	16-49	25-27
Pedestrians	20	(4)	21-62	31-44
Drivers				
Single-vehicle	17	(1)	51-72	54-63
Multi-vehicle	12	(1)	18-51	24-37
Responsible drivers				
All fatal	7	(1)	45-82	63-73
Multi-vehicle only	2	(-)	31-44	—
Nonresponsible drivers	3	(-)	7-12	—
Nonfatal drivers	3	(-)	6-25	—
Crime				
Arrested Populations				
Homicide offenders	14	(3)	28-86	36-70
Assault offenders	8	(2)	24-72	37-48
Robbery offenders	5	(2)	7-72	12-64
Sex offenders	7	(2)	13-63	31-50
Homocide victims	28	(2)	14-87	47-64
Assault victims	11	(-)	4-79	45-58
Robbery victims	4	(-)	12-69	—
Sex victims	4	(1)	6-48	—
Prison populations				
Offenders	27	(6)	14-100	26-50
Suicide				
Attempters	15	(7)	15-64	25-44
Completers	20	(6)	0-80	20-37
Family Abuse				
Marital violence	7	(3)	21-50	44-48
Child abusers	3	(-)	0-34	—
Child molesters	8	(1)	19-49	32-34

[1] New studies are those not included in the Aarens et al. (1977) review.

Table 2. Type II Studies: Drinking History of Persons in the Event

Casualty	No. of Studies Total	New	Range	Interquartile Range
Accidents (Nontraffic)				
Fatal				
Aviation	1	(1)	8	—
Fire	2	(-)	26-53	—
Falls	1	(-)	44	—
Nonfatal				
Burns	1	(-)	44	—
Traffic Accidents				
Accidents	9	(2)	7-48	22-40
DWIs	9	(-)	3-78	20-69
Crime				
Homicide victims	1	(-)	26	—
Prison populations				
Offenders	39	(9)	6-66	22-43
Suicide				
Attempters	22	(2)	1-33	11-24
Completers	21	(2)	2-48	10-24
Family Abuse				
Marital violence	4	(3)	46-93	—
Child abusers	11	(4)	3-69	24-50
Child molesters	12	(1)	7-67	18-49

As the tables also show, casualty areas differ in the ratio of new studies to old. (A few of the "new" studies reported here are not, in fact, studies carried out since the original report; rather, they are studies that made their way into the English language literature in the period between 1977 and 1980.) Several U.S. studies made cross-casualty comparisons, and contributed estimates to a number of casualty areas (Haberman and Baden 1978; Hudson 1976; Jordan 1977). In several areas, new studies make up a very substantial proportion of studies in our series: e.g., Type I studies: aviation, criminal offenders (prison populations), suicide attempts and fatalities; Type II studies: criminal offenders (prison populations); Type III studies: suicides. Just under half of the 125 or so estimates reported here are found in new studies carried out in the United States. This varies markedly across casualty areas. New U.S. work on alcohol and criminal behavior has been especially limited.

Figures 1 through 4 and tables 1, 2, and 3 show the ranges of findings for the three major types of studies. It must be kept in mind that these studies are predominantly from industrialized countries. U.S. studies have been given special emphasis; in some cases—e.g., research on drinking and criminal behavior—the data are drawn rather heavily from the Scandinavian countries and Finland, which have a long

Table 3. Type III Studies: Involvement of Problem Drinkers in Serious Events: Nonfatal and Fatal

Casualty	No. of Studies Total	New	Range	Interquartile Range
		A. Nonfatal		
Traffic				
Accidents	2	(-)	24-40	—
DWI offenses	6	(-)	11-56	14-26
Crime offenses	14	(3)	6-77	18-41
Suicide attempts	12	(3)	12-29	15-23
		B. Fatal		
Accidents (Nontraffic)				
Drowning	4	(1)	0.3-1.8	—
Fire/Burns	3	(-)	0.2-1.2	—
Falls	5	(1)	0.3-3.6	
Other accidents[1]	9	(1)	0.2-3.2	0.4-2.4
Traffic	6	(-)	0.3-1.2	0.2-0.7
Crime				
Homicide offense	2	(-)	1.1-70	—
Homicide victim	4	(-)	0.3-1.3	—
Suicide	23	(3)	0.1-11	0.8-7

[1] Includes, in different studies, accidents of different types.

tradition of research in several casualty areas. It is also important to keep in mind that the alcohol variable is different from study to study—varying from observer report to a specific BAC level. Using suicide as an example, Type I studies of suicide attempts (figure 1) include studies in which the measures are: drinking at time, BAC .01+, intoxicated at time, taken liquor. As another example, Type II studies of crime (prison populations) include studies in which the measures are: alcoholism, alcoholic psychosis, self report: heavy drinker, previous conviction for drunkenness.

Casualty areas differ as to which measure or measures of the alcohol variable predominate; e.g., accident studies (Type I) generally use BAC, whereas crime studies (Type I) generally use police reports or self-reports. There are differences as well in the proportions of studies of a specific type (i.e., Type I, II, III above) in different casualty areas. For example, there are substantial numbers of suicide studies of all three types. Looking at studies of particular crimes: Type I studies of homicide are common; Type I studies of property crime are rare.

In the early report we calculated range estimates for each casualty area (Aarens et al. 1977). These are presented again in figures 1 through 4 of this report. The range estimates in figures 1 through 4 differ little from those in the early report. That is, very few new studies were found that affected the overall range of estimates. Taking the full ranges (as given by each bar) in figure 1, we see that in many cases the full range spans from less than 15 or 20 percent to more than 60 percent. In several cases, the range extends to nearly 90 percent.

Using the full ranges, the lowest upper boundary for Type I as seen in table 1 is 12 percent (nonresponsible drivers), and the highest lower boundary is 51 percent (traffic accidents: fatal, single vehicle). The lowest boundary is 0 (completed suicides), and the highest upper boundary is 100 percent (prison populations: offenders).

As Room (1978) argues in an earlier report,

> A writer seeking to state the maximum case for alcohol's role in serious events can find ample grist for the mill in the epidemiological literature. On the other hand, a writer with the less common agenda of minimizing the role of alcohol can find figures below 20 percent for all except five categories.

The interquartile range refines the picture. (See figures 1 through 4: striped section of bars. The lower limit of the range represents the point below which 25 percent of the studies are found; the upper limit represents the point below which 75 percent of the studies are found.) It represents the middle of the distribution. The advantage of such an estimate is that it removes the statistically deviant cases. While these "removed" studies may be good studies, the assumption is that there may be something idiosyncratic in the design or measurement of "outliers" and that it is important to know where "most" (in this case, the central half) of the studies lie.

As figures 1 to 4 show, the interquartile ranges give a different picture from the full ranges. In several cases we find that the range is sharply narrowed.

	Full Range	Interquartile Range
Fire (fatal)	12-83	30-54
Passengers (fatal)	16-49	25-27
Assault offenders	24-72	37-48
Suicide completers	0-80	20-37

In other cases, the change in the range is much less dramatic.

	Full Range	Interquartile Range
Drivers, single vehicle	51-72	54-63
Homicide offenders	28-86	36-70

This narrowing of the range (or lack of it) is, of course, a function of the amount of variation among estimates in a given casualty area. In several cases, the interquartile range differs little from the full range because there is little variation between estimates. We find this especially in research on traffic accidents. The standard deviations are the smallest in these studies.

Is there a single overall estimate or a "best" estimate of alcohol's presence in these events? Clearly not. Each of these casualty areas is a different type of event; within each category there is considerable variation in the context of the events themselves, the personal and social characteristics of victims and offenders, the time of day or night at which events occur. Thus, summarizing all areas together to get a single estimate would make little practical or theoretical sense.

The question of whether point estimates are to be preferred to range estimates is important. It must be kept in mind that the studies on which these estimates are based differ in the definition of the event within a given casualty area, in the measure of alcohol that is used, in the adequacy of the sample, and in the type of restrictions put on the sample (e.g., adults only or men only). Point estimates, therefore, suggest a spurious precision in an area which, in our view, does not merit it.

What are the relative gains from range estimates? These estimates present a clear picture of the extremes in estimates across casualties and crime. Refined by the interquartile range, they suggest as well the central tendency of estimates within a single area. For example, researchers can ask whether the interquartile range narrows the full range estimate, as would be the case in casualty areas with a few studies at the extreme, or narrows it by relatively little, suggesting either little variation in estimates or a large proportion of estimates at the extremes. Range estimates are useful precisely because they show the variation in individual estimates. It is the variation in estimates and the differences between estimates in similar casualty areas that need to be explained in order to advance this research tradition.

Quality of Studies

While discussion of the quality of data on serious events cannot be separated from the general norms of social research, to some extent it needs to be. A certain wisdom can be gained from the cumulative studies that report alcohol involvement in casualties and crime. Studies that have been carried out over a period of a century in most Western countries, some Eastern countries, and a few Third World countries, which systematically show the presence of alcohol in a large proportion of cases, cannot be ignored. Yet it is fair to say that outside the area of traffic research there are few, if any, well-designed studies of alcohol's role in serious events. Often the alcohol findings are serendipitous findings in an otherwise well-designed study investigating some other relationships.

The earlier review of the research on serious events made exhaustive criticisms of method and theory in each casualty area. Several types of methodological problems are particularly common to this literature: definition of the serious event in each area, variations in simple parameters, and problems in alcohol reporting.

Table 4 presents a number of studies that would be considered of higher than average quality for research of this kind. Only one has a corresponding control group. But, in all cases, care has been taken to define sample parameters, define the casualty event under investigation, and give a relatively precise definition of the alcohol variable. In a separate analysis (not reported here), we compared a group of "better" studies with the interquartile ranges and means reported in tables 1, 2, and 3. In almost all cases, the proportions fall within the interquartile range and within a half of a standard deviation of the mean.

Table 4. Examples of "Good" Studies of Serious Events

Author, date, location	Sample	Percent Alcohol Presence		Alcohol Sample	Alcohol Measure
Wechsler et al. 1969 Boston, Mass.	11,644 adult (over 15) cases eligible for study in emergency room of MGH Two separate groups were analyzed: 5,622 who received breathalyser tests and 1,222 who received blood tests or interviews which determined alcohol use. The former is presented here.	Industrial Accidents	16	5622	BAC 0.1
		Fire (burns)	38		
		Falls	23		
		Traffic	30		
		Assault	56		
Halpin et al. 1975 Maryland	206 fire deaths (approx.) 50% of all fire deaths in Maryland occurring in 172 fires. Only where coroner ordered autopsy.		52	166"adults over 10 years"	BAC (positive)
Berl and Halpin 1976 Maryland	257 fire deaths: autopsies only.		55	75"adults over 11 years"	BAC (positive)

Table 4. Examples of "Good" Studies of Serious Events

Author, date, location	Sample	Percent Alcohol Presence	Alcohol Sample	Alcohol Measure
Brown and Lane 1977	213 pilot fatalities in 250 consecutive fatal accidents.	18 (of those tested)	138 acceptable BAC samples	BAC .015
Kirkpatrick and Pearson 1978	46 falls in a sample of 71 cerebral injuries among 61-year-olds and over.	30	all	autopsy and history
Gerson and Preston 1979	2,567 (common assault)	34	—	Police reports: "alcohol related"
	272 (assault with injury)	46		
	290 (sexual assault)	19		
	139 (assault of police official)	40		
	55 (rape)			
Beck et al. 1976	416 suicide attempts admitted to two general hospitals compared in Aarens et al. (1977) to San Francisco general population sample.	"Episodic and Excessive" 22 "Habitual excessive" 8 "Addicted" 3	384 with complete data	APA diagnosis plus questionnaire

One recent U.S. study, however, must be singled out as of exceptional quality, even though it is also an uncontrolled study: Haberman and Baden's study (1978) of violent death. This study gives estimates of alcohol presence at the time of death on 73 percent and drinking history on 100 percent of a sample of unnatural deaths that occurred in New York City between August 1974 and August 1975. Care is taken to present a clear case for classifying decedents as alcoholics or narcotics abusers. Summary data are presented here in tables 5 and 6. Apart from the overall high level of positive BAC across casualty types, what is noteworthy in these findings is the substantial proportion of those drinking who were intoxicated. In falls, fires, and homicides, these proportions are 85 percent, 85 percent, and 64 percent, respectively.

Table 7 cites estimates from relatively "good" studies for each casualty and crime area. Every study cited here is not equally good, but the one cited is among the "best" that exist in each area. The point to be made in citing these studies is that, even within a weak research tradition, some studies are *relatively* better than others. A sign of the general weakness of this area of research is the failure of investigators studying alcohol's role in serious events to cite the "best" available studies. Instead, studies are cited helter-skelter or are chosen for their problem-enhancement capability. Thus, in the area of alcohol's role in crime, Shupe (1954) is the study most commonly cited. This is true despite the fact that it is methodologically worthless (Roizen and Schneberk 1977). Wolfgang's (1958) work on homicide is also frequently cited, but in a run of citations with other works of lesser quality and no explanation of the differences. If research efforts are to advance these problems theoretically and methodologically, the "better" studies must be sought out.

Table 5. Percent of BAC Levels ≥ by Casualty in Haberman and Baden, 1978[1]

Casualty	Sample[2]	Percent BAC ≥ .10	Percent Positive BAC
Suicide	247	16 ≥ .10	32
Homicide	499	27 ≥ .10	42
Motor Vehicle			
Driver	61	38 ≥ .10	52
Passenger	25	16 ≥ .10	24
Pedestrian	61	21 ≥ .10	30
Fall	54	41 ≥ .10	48
Fire	28	46 ≥ .10	54
Drowning	19	53 ≥ .10	68

[1] Data collected during 1974-1975.

[2] *N* on which BAC taken.

Table 6. Percent of Alcoholics by Casualty in Haberman and Baden, 1978[1]

Casualty[2]	Sample	Percent Alcoholic[3]
Suicide	336	21
Homicide	546	27
Motor Vehicle	204	24
Driver		
Passenger		
Pedestrian		
Fall		
Fire	182	34
Drowning		

[1] Data collected during 1974-1975.

[2] Decedents were classified as alcoholics and narcotics abusers on the basis of informant reports or physical findings of related problems . . . only 17% of the 803 alcoholics . . . were classified by informants alone without physical evidence . . . 44% of the alcoholics . . . were classified on the basic of physical evidence without informant affirmation . . . 39% of the alcoholics . . . had both.

[3] Includes alcoholics who were also drug abusers.

Control Studies

As we have argued, estimating alcohol's role in serious events is particularly difficult because so few studies in this area either have rigorously specified control groups or are based on general population samples. To establish the association of an alcohol indicator and a serious event, both variables must have the opportunity to vary in the population under study. Because the serious events discussed here are rare events, most studies of alcohol and serious events do not use a general sample of persons but rather a sample of serious events. As an example, traffic crashes may be examined in a general population sample of men in which alcohol use is one variable under investigation. This type of study allows both the alcohol variable and the casualty variable to vary in the population. Contrasted with this is a sample of accident victims admitted to an emergency room and tested for alcohol use. The alcohol variable can vary in such a sample, but all members of the sample have, by definition, been in an accident.

Table 7. "Good" Studies in Each Area

Category	Percent	Study Author, Date
Accidents: fatal		
Industry	40	Naeve et al. 1973
Aviation	18	Brown and Lane 1977
Drowning	47	Stiehl 1975
	68	Haberman and Baden 1978

Table 7. "Good" Studies in Each Area

Category	Percent	Study Author, Date
Fire	42	Berl and Halpin 1976
	54	Haberman and Baden 1978
Falls	48	Haberman and Baden 1978
Accidents: nonfatal		
Industry	16	Wechsler et al. 1969
Burns	18	Wechsler et al. 1969
Falls	23	Wechsler et al. 1969
Traffic accidents: fatal		
Drivers	44	Neilson 1969
Passengers	27	Freimuth et al. 1958
Pedestrians	37	Neilson 1969
Drivers		
Single vehicles	56	Hudson 1976
Multi-vehicle	32	Neilson 1969
Responsible drivers		
All fatalities	45	Perrine et al. 1971
	82	Bako et al. 1977
Multi-vehicle only	44	Neilson 1969
Nonresponsible drivers	12	Neilson 1969
Crime		
Homicide offenders	55	Wolfgang and Strohm 1956
Assault offenders		
Common assault	34	Gerson and Preston 1979
Assault with injury	46	
Robbery offenders	7	Normandeau 1968
Sex offenders	60	Gerson and Preston 1979
Homicide victims	27	Haberman and Baden 1978
Assault victims	60	Thum et al. 1973
Robbery victims	66	Leppa 1974
Sex offense victims	31	Amir 1971
Prison population:		
Offenders	43	U.S. Department of Justice, Law Enforcement Assistance Administration 1974
Suicide		
Attempts	40	Adam et al. 1978
Completions	16	Haberman and Baden 1978
	40	Deasy et al. 1973
Family Violence		
Marital violence	28	Gerson and Preston 1979
	49	
Child abusers	13	Gil 1973
Child molesters	34	Gebhard et al. 1965

In this literature most of the studies are of the second type. Most studies use a sample frame defined by the type of event or, in some cases, by an alcohol indicator (e.g., admission to an alcoholism treatment center). This makes studies based on general population samples or studies with control groups particularly important. This importance is underscored by an example from the French casualty literature. In a study of accidents on the job, 30 percent of the sample were found to have BACs of .05 and above; at the same time, it was discovered that 23 percent of a sample of fellow workers had equivalent BACs.

The types of control vary by the types of studies (Types I, II, III). Few studies use general population data. More frequent, but still relatively infrequent, is the use of a control sample or population. In Type I studies (alcohol in the event), the control sample is a sample of people in equivalent situations where a casualty has not occurred. In Type II studies (drinking histories and problems of people in serious events), control data exist in general population data. In the following section on suicide, one analysis compares a study of attempted suicides with a general population sample standardized on particular demographic characteristics. A similar strategy is used for comparing samples of labeled alcoholics with the general population to determine the alcoholics' risk of accident or death relative to members of the general population who are similarly situated.

One way to bring quasi-control-group information to bear on serious events is to study special populations—e.g., blacks, youth, ghetto dwellers, sportsmen. Looking at these relationships in special populations moves the focus away from the general relationship of alcohol and a serious event to that in a more narrowly defined population. This allows for a greater emphasis on the social, personal, and situational contexts of events. It also becomes possible to link what is known about alcohol and serious events to other research on the specific population, for example, drinking patterns of young men or blacks or women. Few studies in this literature are analyzed in sufficient depth demographically to do this sort of analysis. Therefore, we do not know in most cases whether, if we could control for time of day, social contexts, and personal characteristics of victims or offenders, we would find the same level of alcohol involvement in events similar in kind to those with unfortunate ends. Several studies that attempt this sort of analysis are cited in this section.

It may also be the case that well-designed control studies are not possible in some of these casualty areas. As we argued in the earlier report, "the researcher may end up looking for matched controls in a particular neighborhood who are on a rickety ladder in a high wind, that is, in a situation in which no sober person in his right mind would find himself."

Control studies are particularly a problem in those areas of research on serious events where intention is assumed to play a part, e.g., criminal behavior and suicide. In this section, we mention several recent studies that are not control studies but are suggestive of future work to be done with control groups. We have done this because this is the only section of the paper that deals with serious events casualty by casualty and because in many areas there are no adequate control studies.

Traffic Crashes

In the United States, traffic crashes are the major cause of violent death and an important cause of serious injury. In 1977 an estimated 49,500 men, women, and children died in motor vehicle crashes; almost 2 million were injured. More than 16 million crashes involved property damage. As the summary charts show, between 35 and 64 percent of the drivers in fatal accidents and between 6 and 25 percent of the drivers in nonfatal accidents had been drinking at the time of the accident.

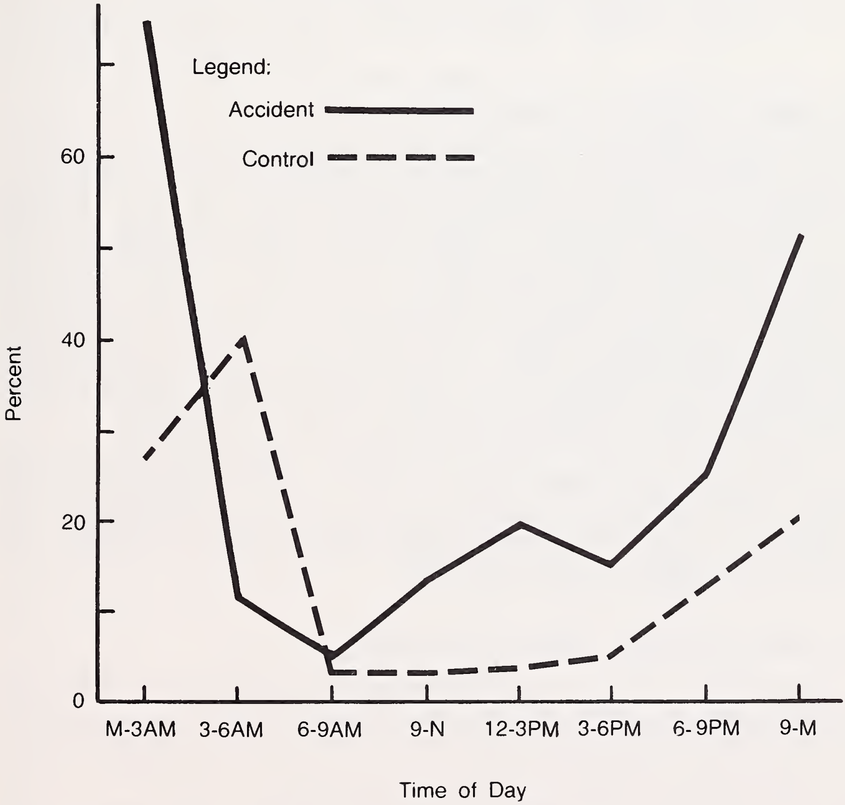
Traffic crashes are the most thoroughly studied of all serious events. Although several hundred studies of alcohol involvement in crashes have been done, however, only six of these are control studies. Of these, one was done in the late 1930s (Holcomb 1938); one has an inadequate sample size (McCarroll and Haddon 1962); and one uses a control sample of non-accident-involved drivers matched to the accident sample by age, sex, and general residential area rather than by time and place (Boston University School of Law 1976).

Control Studies of Traffic Crashes. Although control studies differ in design and method, all studies found that the relative probability of crash involvement increased as blood alcohol content (BAC) increased. At a BAC above .10, the relative probability was found to be several times that for 0 BAC. This increased risk held for rural and urban crashes, for fatal and personal injury crashes, for single- and multiple-vehicle crashes, and for drivers responsible for their crashes. In general, the alcohol-related risk at a higher BAC is substantially greater for serious accidents—those involving injury or death—than for all accidents taken together. These studies have shown also that at higher BAC levels the relative probability of causing a crash is significantly greater than that of being involved in a crash. One analysis has shown that the relative risk of being responsible for a crash at a BAC of .10 varies from slightly less than 3 times as great to about 15 times as great as the relative risk at zero blood alcohol. In contrast, "the relative risk of being involved in an accident but not judged responsible for the crash is only about 1.6 or 1.7 times as great at all positive levels of blood alcohol as at zero blood alcohol" (Cameron 1977; Hurst 1973).

A number of factors affect the relative probability of crash involvement. These include demographic and personality characteristics of drivers as well as driving-related and situational variables. Young drivers (those under 25) and older drivers (those over 60) were overrepresented in both fatal and nonfatal crashes. Women are underrepresented in fatal and nighttime crashes but are overrepresented in nonfatal crashes. For young and old drivers, men and women, the relative probability of crash involvement increases as blood alcohol increases. However, the level of risk varies. A reanalysis of an earlier control study shows, for example, that the probability of an alcohol-present accident is significantly different for various age groups. At all BAC levels, male drivers under 24 and over 65 have a higher risk than men in the middle years. As the BAC increases, the effect is stronger, with the risks of an accident increasing sharply for both very young and very old drivers (Zylman 1972).

Figures 5 and 6 show the effects of time of day and day of week on alcohol presence for both accident victims and controls. As these data show, the proportion of drivers in both groups who had been drinking vary substantially by time of day and day of week. The figures also indicate the marked differences between accident and control groups in level of alcohol presence *within* a single time period or for a particular day of the week.

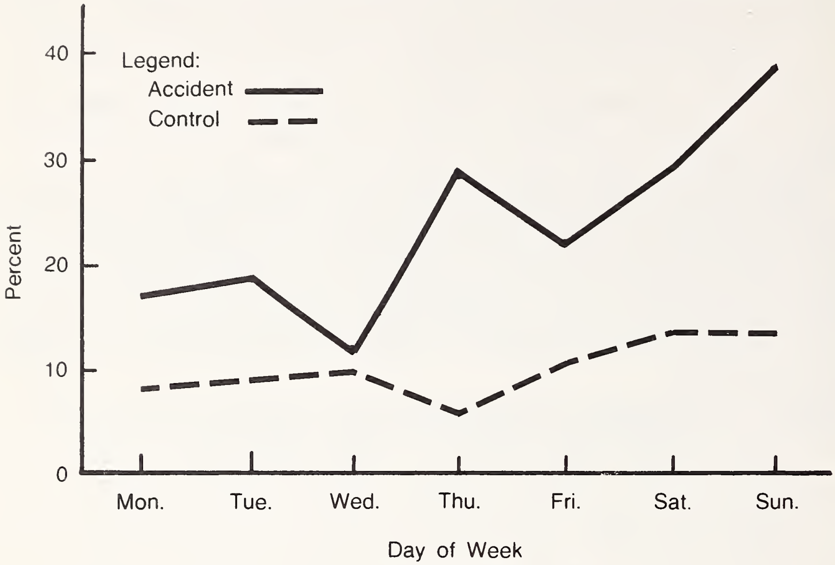
Figure 5. Proportion of Accident and Control Drivers with Positive BAC (BAC ≧ .03%) by Hour of Day



SOURCE: Farris et al. 1975.

An important debate in traffic research has centered on the role of the problem drinker or "alcoholic" in causing traffic crashes. Studies

Figure 6. Proportion of Accident and Control Drivers with Positive BAC (BAC ≧ .03%) by Day of Week



SOURCE: Farris et al. 1975

differ in the proportions of crashes that involve problem drinkers (Bacon 1968; Fine and Scoles 1974; Selzer and Vinokur 1975). One study examines the relative probability of crash involvement for problem drinkers in a control group of licensed drivers matched by age, sex, and residence (Boston University School of Law 1976). The data show that 40 percent of drivers judged most responsible for fatal accidents were identifiable as problem drinkers; this made up 48 percent of the sample of drivers responsible for their own fatal injury, 41 percent of the sample of drivers who survived but were responsible for another fatality, and 31 percent of a sample of drivers who fatally injured a pedestrian.

While control studies advance knowledge of alcohol's role in traffic crashes to a degree, care must be taken in their interpretation. The design of the studies, their geographic location, and the definition of the casualty all vary. Even when studies are similar in method and substance, relative risk estimates differ.

Accidents: Industrial, Home, Recreational

While motor vehicles are responsible for almost half of accidental deaths, they are far less important to the rate of injury. Home and public places are the primary loci of injury. Of all forms of accident, falls are the most prevalent. Alcohol is present in a substantial proportion of adult accidental injuries and accidental nontraffic deaths. Unfortunately, even fewer control studies appear in the accident literature than appear in the traffic literature. Thus, although a recent study of falls included in a series of cases of fatal cerebral trauma showed that 24 percent of the victims were problem drinkers, what is not known is the proportion of elderly persons who had been drinking at similar times and places (Kirkpatrick and Pearson 1978).

Three general population studies have shown a relationship between drinking practices and accidents; none of these studies, however, look at discrete accident events. In a study of high school students, one investigator (Suchman 1970) found that 36 percent of regular drinkers as compared with 8 percent of nondrinkers had two or more accidental injuries in the previous year that "either bothered you for 7 days or interfered for that long with things you usually do." A nationwide survey of adults found a modest relationship between drinking practices and accidents (Brenner et al. 1966). A national survey of young men (age 20-30) also found a relationship between general drug use (including alcohol) and health or injury problems (O'Donnell et al. 1976). Nearly 6 percent of the total samples reported injuries as their most serious alcohol-related health problem. Among the substantial number of heavier drinkers in the sample, this proportion was 11 percent. Although these general population samples show a relationship between heavier drinking and accidents, they often give little indication of the role of alcohol in the accident event.

In the next section we review several areas of accidental injury and death. Although a number of studies showing alcohol presence are available for each event type, few of these offer controls of any kind.

Industrial Accidents. Although occupational accidents affect a substantial part of the working population, little event-based research on these accidents has been carried out in the United States. In part, this is because the focus on work-related alcohol problems has centered on alcoholism; this lack of research interest may also reflect the strong norms against drinking in work settings. One recent study suggests that work-related alcohol problems in the United States may be more important than has previously been acknowledged. Mannello and Seaman (1979), in a study of railroad workers, report that in their sample of seven railroads "an estimated 30,000 workers drank on duty on an estimated 90,000 occasions during the year reported on. This on-the-job drinking creates fear among a large number of workers." Sixty-six percent of workers said that they were afraid of what might happen to them when fellow workers drank on the job. Thirty-five percent of workers saw fellow workers drink on duty in the year prior to the study. Only 4 percent of accidents on the railroad were thought to be alcohol related. The investigators argue, however, that there appears to be more alcohol-related injury than is reported.

There are no adequate U.S. studies of industrial accidents with control samples.

Falls

After motor vehicle accidents, falls are the most common causes of accidental death and account for over 60 percent of injuries. The elderly are particularly vulnerable to falls. As figure 1 shows, alcohol is present in the victim in from 10 to 50 percent of fall deaths and 13 to 63 percent of fall injuries. Haberman and Baden (1978) found that almost 50 percent of those dying from falls had been drinking. There are no event-centered control studies of falls, nor are there studies that accurately place the context, especially the time of day. This is an essential area for new research.

Three studies have determined the relative risk of alcoholics' dying of falls (Brenner 1967; Nicholls et al. 1974; Schmidt and deLint 1972). In each study, samples of alcoholics were compared with age- and sex-specific general populations. Alcoholics' risk varies from 5 to 13 times that in the general population. As one study argues, however, "Treated alcoholics differ from the general population on many characteristics besides drinking. They tend to have different life styles and live in poorer neighborhoods, and may fall more because they are exposed to environmental hazards, such as rickety stairs and cracked sidewalks."

Fires and Burns. Although the reported level of alcohol involvement in adult fire deaths is high, there are no control studies of either drinking at the time of these events or drinking histories of those to whom fires and burns occur. Nor is it clear what type of control would be appropriate. To show that proportions of adults similar to the proportions of fire victims had been drinking doesn't speak to the overriding issue of whether and how alcohol impairs fire victims. One approach taken by Halpin et al. (1975) is to compare fire deaths with other deaths. These investigators found that 52 percent of adult fire deaths involved alcohol, while only 42 percent of all deaths involved alcohol. Another possible control would be knowledge of what proportion of people who escaped from a fire had been drinking.

Alcoholics appear to be particularly vulnerable to fire. One study that compared the fire death rate with a clinical sample of alcoholics found that alcoholics were 10 times as likely to die in a fire as members of a standard comparison population (Schmidt and deLint 1972).

Drowning

Estimates of alcohol presence in drowning vary substantially. As figure 1 shows, the estimated alcohol presence in drowning victims varies from 4 to 83 percent. In part, this variation is due to the failure to separate analytically children who are drowning victims from adults. It also reflects the differences in coroners' practices in testing for alcohol.

Haberman and Baden (1978) report that 68 percent of drowning victims had been drinking. Hudson (1976), in a study of recreational deaths, reports that 50 percent of victims had been drinking. In an important study of survivors, the Surf Lifesaving Association of Australia (British Medical Journal 1979) reports that a third of all those who came close to death from drowning had been drinking. There are no control studies of drowning, but it is to be expected that the level of drinking of those similarly studied drowning victims is high.

Alcohol is consumed in quantity during recreational activities. In a surprising but interesting study in Finland, Penttila et al. (1979) conducted the equivalent of roadside tests on weekend motorboat drivers. The breath test was positive for 30 percent of the boaters, although no study was made of alcohol presence in relation to accidents. In general, further study is needed of alcohol in recreational accidents.

Crime

Although alcohol is reportedly present in a large proportion of criminal events, there are no event-based control studies of criminal behavior. Since criminal behavior occurs more frequently on certain days and at certain times, temporal control studies are possible. It is also possible to use a quasi-control strategy by comparing drinking patterns of those in the general population most likely to commit crimes with what little is known about the drinking patterns of offenders.

A recent analysis of the drinking patterns and criminal behavior of black men used a quasi-control strategy of this kind (Roizen 1980). Looking at demographically defined special populations, such as black men, allows a closer look at social behavior than is possible employing general population data. In this study it was possible to combine survey data with ethnographic data to look at drinking patterns and drinking controls of lower class black men—those most at risk of involvement in criminal behavior. Although criminal offenders drink more and have more drinking problems than those of relatively comparable status in the general population, there was little evidence to support the view that a disproportionate amount of black crime was a consequence of drinking. Black offenders were slightly less likely than whites to have been drinking before a criminal event. Further, lower status blacks in the nonoffender population did not differ markedly from other lower status men in drinking patterns and practices as might be expected if alcohol were particularly related to the criminal behavior of blacks. A look at the ethnographic data on black taverns, however, suggests that these drinking contexts may play a part in the organization and maintenance of ghetto crime.

Few studies of criminal offenders define drinking problems with enough specificity to compare against measures used in general population data. Two studies of male prisoners that do so are shown in table 8. When compared with roughly comparable measures from general population studies, prisoners clearly have a greater incidence of drinking problems. In a recent analysis of drinking problems and histories of offenders, however, we argue that when social status is controlled or when offenders are compared with other men in the general population with serious psychological and social problems, differences between the two groups are significantly smaller. There has been little analysis of the relationship between drinking problems and criminal behavior after drinking, i.e., the relationship between "chronic" and "acute" drinking problems. Studies that have compared the two types of problems show a positive correlation—problem drinkers are more likely than other offenders to have been drinking at the time of the crime (California Department of Public Health 1960; Mayfield 1972). Further work on the relationship between "chronic" and "acute" drinking is needed if drinking problems are to be used in establishing a causal link between alcohol and crime.

Alcoholics and problem drinkers who turn up in treatment samples or samples of labeled alcoholics have records of criminal behavior far greater than those expected in the general population. It is not clear, however, from these few studies whether the alcohol leads to criminal behavior or criminal behavior leads to drink (Goodwin et al. 1971; Roizen and Schneberk 1977). Goodwin, with rare longitudinal data, has argued that "Criminality by and large preceded the development of a drinking problem."

Suicide

Suicide, unlike other casualties presented here, is the result of a long period of unhappiness and depression. It is a final resignation from life circumstances that were ill suited to social circumstances. Thus, alcohol-based explanations of suicide are more reasonably focused on alcohol histories rather than on alcohol in the event. Studies show that between 15 and 64 percent of suicide attempters and up to 80 percent of completers had been drinking at the time of the event. For those with histories of problem drinking, these proportions are from 1 to 33 percent (attempters) and 2 to 48 percent (completers).

Given the long-term nature of suicide, it is unclear what a reasonable control group is for this casualty. It can be argued that the best controls are those who are chronically depressed and psychically disorganized. Baker et al. (1977), in a recent study of suicide attempts, shows that when suicide attempters are compared with controls from a psychiatric unit, the differences in proportions of problem drinkers are small. Thirty-two percent of the attempters were labeled problem drinkers, compared with 29 percent of the controls.

In one important control study (Beck et al. 1976), a sample of suicide attempters and a general population sample are compared. The Beck study is based on interviews with 400 suicide attempters. This group is compared with a general population sample of adults surveyed as to their drinking practices and problems within approximately the time frame of the Beck study. The alcohol indicators in both studies are comparable. When these similar drinking indicators were applied to the two groups, it was found that the percentage of excessive drinkers in the suicide attempt population was not larger than in a normal urban population. Of the attempter population, 22 percent were episodic excessive drinkers, 8 percent were habitual excessive drinkers, and 3 percent were addicted to alcohol. The comparable figures for the comparison group were 18 percent, 9 percent, and 3 percent.

The two samples were compared on drinking problems as well, but for this purpose the control sample was standardized for important demographic differences. These alcohol problem data are given in table 9. It is clear from this analysis that the 1-year prevalences of drinking

Table 8. Comparison of Drinking Problems in Two Prison Samples with Drinking Problems in a National Sample of Men

North Carolina Prison (Mayfield, 1972)		General Population Samples of Men
37% of the sample had one or more indication of problem drinking	13% label self excessive drinker, problem drinker or alcoholic.	2.5% label self alcoholic or problem drinker[1]
		2.5% label self as ex-alcoholic or problem drinker[1]
	5% received treatment for alcoholism	4% yes to "Have you ever been tested or had counseling for any drinking problems?"[2]
	25% had been convicted of drunkenness or DWIL	28% yes to "Were you ever arrested for drunk driving" or "Have you ever gotten into any other kind of trouble with the law because of anything connected with drinking or with alcohol (aside from drunk driving arrests)?"[3]
		14% yes to "Did drinking ever cause you to have an accident or injury of some kind—at work, at home, on the street, or someplace else?"[3]
Mississippi Prison (Globetti, 1974)		**General Population Samples of Men**
40% had three or more personal and social complications as a result of drinking		29% had high current or high past problems (respondent reported relatively severe problems in at least two of a dozen problem areas or seven or more mild problems associated with drinking: Cahalan/Room "Overall Problem Score," (see Cahalan and Room 1974, pg. 27) (National Sample of Men 1973)

SOURCE: Roizen and Schneberk 1977.

[1] Roizen 1974 (National Sample of Men 1973).

[2] Cahalan and Treiman 1976, Table 20.

[3] Reanalysis of 1967 San Francisco sample, men only, 21-59, described in Cahalan and Room 1974.

problems are significantly greater in the attempter group than in the general population. Suicide attempters were more likely to have been arrested or picked up by the police, more likely to have lost a job, and more likely to have lost a spouse. If the problem time frame is expanded to include *ever* experiencing these problems, the differences between the two samples are reduced. Job and spouse problems, as well as labeling self a problem drinker or alcoholic, persist among attempters, even in the expanded time frame.

It might be thought that suicide attempters are quasi-controls for completers. However, several studies find that in most respects the attempter population does not resemble the completer population demographically. Research also shows that "alcoholics" who commit suicide have had a history of more suicide attempts than nonalcoholics, and alcoholic attempters more closely resemble final suicides demographically than do nonalcoholic attempters. This may be an indication that alcoholics who attempt suicide form a significant part of the population that later goes on to complete suicides.

Alcoholics are certainly more likely than others to drink during the suicidal act. An analysis of both attempted and completed suicides shows that 42 to 100 percent of alcoholics had been drinking at the time of the suicidal act, compared with 8 to 38 percent of nonalcoholics (Aarens and Roizen 1977).

As might be expected from the fact that alcoholics form a significant part of the attempter population, alcoholics are particularly at risk of suicide death. Although the relative risk of suicide varies for alcoholic populations, one study shows the risk to be 30 times as great as for the general population (Medhus 1975). However, since suicide rates vary by age, sex, and other demographic characteristics, alcohol samples should be matched against similar samples of the general population. As Aarens and R. Roizen have argued,

> The crucial problem is not the overall risk of the whole population of alcoholics, but rather the risk of the smaller number of suicidal alcoholics. This is the group that needs identification and treatment. Many alcoholics also have other high risk factors for suicide—history of attempts, physical illness, intense feelings of depression and hopelessness—that can increase their suicide risk to a point many times that of normal, or even of alcoholic, populations. In one study, a subsample of callers—"depressed alcoholic middle-aged men"—were identified as a group whose risk of suicide was 1000 times greater than the general population. Such a group might well be the focus of attention for future research (Litman et al. 1974).

Family Violence

Child Abuse, Neglect, Molesting. Every year more than 600,000 cases of child abuse and neglect are reported in the United States.

Table 9. Alcohol-Related Problems Among Suicide Attempters, in the San Francisco General Population, and in the San Francisco Sample Standardized by Age, Sex, and Marital Status (Current and Lifetime Prevalences; Whites Only)

Drinking Problems[1]	Beck et al. Sample	San Francisco General Population Sample		
	Suicide Attempters	"Current" Drinking Problems		"Lifetime" Problems
		Unstandardized	Standardized	Standardized
Picked up by police[2]	10.9-12.4	0.5	0.6	5.4
Doctor said cut down[3]	7.9- 8.6	2.3	2.5	5.4
Accidents or injuries[4]	9.9-11.4	2.4	3.6	15.8
Failed to do things[5]	10.4-13.4	1.9	2.8	7.9
Lost a job[6]	6.4- 7.9	0.6	0.8	1.3
Spouse left or threatened[7]	4.5-71.5	1.1	0.8	1.3
Problem drinker or alcoholic[8]	11.4-20.8	2.1	2.3	3.4
	(*N*=202)	(*N*=1138)		

SOURCE: Aarens and Roizen 1977.

[1] See Table S-8 in Aarens and Roizen 1977 for the complete drinking-problem questions asked in the suicide-attempter sample.

[2] The comparable San Francisco Survey item read: (just following an item concerning drug driving arrests) Have you ever gotten into any other kind of trouble with the law because of anything connected with your drinking (aside from drunk driving arrests)? Positive response: Yes, during the last 12 months (for columns 2 and 3); Yes, ever (for column 4).

[3] San Francisco item: Did a doctor ever tell you that drinking was having a bad effect on your health? Positive response: Yes, during the last 12 months (for columns 2 and 3); Yes, ever (for column 4).

[4] San Francisco item: Did drinking ever cause you to have an accident or injury of some kind at work, at home, on the street, or someplace else? Positive response: Yes, during the last 12 months (for columns 2 and 3); Yes, ever (for column 4).

[5] San Francisco item: Sometimes I get drunk even when there's an important reason to stay sober. Positive response: True now (for columns 2 and 3); True ever (for column 4).

[6] In order to improve the comparability between the Beck et al. and the Cahalan and Treiman data, two Beck items concerning job loss were combined: thus, saying yes either to "Has an employer fired you or threatened to fire you if you did not cut down or quit drinking?" or to "Have you quit a job or changed jobs because you were in trouble or likely to get into difficulty due to drinking?" qualified the respondent for a positive response. The comparable San Francisco item read: Have you ever lost a job because of drinking? (Positive response: Yes, in 1974 or 1975 (for columns 2 and 3); Yes, ever (for column 4).

[7] Here, two San Francisco items were combined in order to improve the comparability between the two data sets. These were: Have you ever been separated or divorced because of your drinking? Positive response: Yes, in 1974 or 1975 (for columns 2 and 3); Yes, ever (for column 4); or Which people, if any, threatened to end their relationship with you because of your drinking, in the past 12 months? (Positive response: My spouse. . .).

[8] Two Beck items concerning self-characterization of one's drinking status were combined: saying "yes" either to "Do you consider yourself a 'problem drinker'?" or to "Do you consider yourself an 'alcoholic'?" qualified the respondent for a positive response. The San Francisco item read: Which one of the following terms would best describe your drinking at the present time? Positive response: A problem drinker or alcoholic (for columns 2 and 3); A problem drinker or alcoholic or An ex-problem drinker or ex-alcoholic' (for column 4).

Neglect and abuse constitute the second most common cause of death for small children. Every year there are thousands of cases of incest and sexual assault on children (*Victimology* 1977). The role of alcohol in these incidents and the level and kinds of drinking problems in the families of these children are not known. There are relatively few U.S. studies of abuse. As figure 1 shows, between 0 and 34 percent of perpetrators of child abuse had been drinking. These are undoubtedly low estimates of alcohol presence. As is true of all family violence, child abuse and neglect are hidden problems. In one study of parents of battered babies in England, which had as controls children admitted to hospital emergency rooms, the abuse sample and the control sample did not differ either as to level of "alcoholism" or as to drug dependence. This may reflect the fact that there are, indeed, no differences between the two groups, or it may be a consequence of a hidden set of personal and familial problems in the sample of abusers.

Although alcohol was reported to be present in proportionately few cases of abuse in one major U.S. study, drinking did figure importantly in certain types of abusive events (Gil 1973). Alcohol intoxication was associated with physical abuse of children perpetrated by male caretakers and in situations where children came to the aid of a parent or were the object of the quarrel initially.

The evidence suggests that nearly a third of those in prison for molesting children had been drinking prior to the offense. This level of drinking prior to an offense is no greater than that of offenders imprisoned for other crimes. However, one study that compared drinking histories of sex offenders with those of a control sample of persons never convicted of any crime and persons convicted of nonsexual offenses reported considerably more "alcoholics" among child molesters than in the general population (Gebhard et al. 1965).

Studies that focused on drinking histories and drinking problems of *parents* of abused children have reported a wide range of findings. U.S. studies have generally found substantially lower levels of drinking problems than foreign studies. U.S. studies have found that about a third of abusive parents had histories of drinking problems. However, in a study of children from multi-problem families, parental neglect was not found more frequently in a sample of alcoholic parents when compared with those who were not alcoholic. Almost a quarter of the parents in both groups were characterized as neglecting their children (Scientific Analysis Corporation 1976).

The variability in alcohol findings across studies and the absence of control studies in these important areas suggest that this is an important area for further research. This is especially true in periods of economic recession and high unemployment. Research seems to show that child-abusing families are relatively poor and likely to be unemployed or underemployed. The relationship between personal and financial stress, alcohol, and family violence is an important area for further investigation.

Marital Violence

Although the problem of marital violence has received much attention in recent years, the role of alcohol in marital violence is unclear. While some important research makes the case that family disputes and assaultiveness are not usually related to alcohol use and abuse (Zacher and Bard 1977), other research suggests that the level of alcohol problems in these families is high (Emerson 1979; Roy 1977). This may mean that alcohol is less important in the violent events themselves than in the conditions leading up to violence. Two recent U.S. studies show high levels of alcohol problems in samples of abused women. In a study of referrals to a rural clinic, Hilberman and Munson (1978) found "alcoholism" to be a significant problem for almost all the husbands in the sample. Roy (1977), in interviews with 150 women randomly selected from shelters for abused women, found high levels of alcohol problems among husbands. In families in which the adults had been together for 7 years or more, alcohol problems were found to be particularly severe.

In contrast to an earlier study of family disputes by Bard and Zacher (1974), a survey of family dispute cases carried out by the Los Angeles Police Department reported that nearly half of the incidents they investigated involved alcohol or drugs (Emerson 1979). Although fewer than 10 percent of these incidents involved an arrest, they are an indication of high levels of family stress and a serious drain on police resources. In the cases investigated, 59 percent of the husbands and 26 percent of the wives were under the influence of alcohol and/or drugs, according to police reports.

There are no U.S. control studies of marital violence. In an important Canadian study, 46 percent of the families sampled from family court cases reported alcohol as a problem (Byles 1978). Thirty-eight percent reported that one spouse was regularly intoxicated. Of those families with violent histories, 71 percent had alcohol problems compared with 27 percent of those without violent histories.

Conclusion

In this section we have reviewed control studies or quasi-control studies where they exist in each casualty area. As we have seen, there are few control studies in each area and few control studies of each type (referring back to Types I, II, and III developed earlier). There are especially few control studies of alcohol-related events (i.e., Type I studies).

An argument used by one investigator with respect to research on marital violence has wider application in this area of research.

> There are several problems with studies which attempt to ascribe alcohol drinking to problems of marital violence. First, no research has yet established a sequence of events leading to battering situations. Second, there is no historical

> compilation of events which could interpret change over long-range battering situations. Third, if alcohol is said to be associated with the problem, no study has empirically established how and when drinking occurs, or if the drinking situation included one or both parties. Fourth, although mentioned in some studies, no research has yet determined the importance of other contributing causal factors. (Morgan in this monograph)

These are questions to be raised in all areas of research on alcohol's role in serious events. These are questions especially relevant to the design of control studies.

New Directions

The research problems outlined in this section are not meant to be a comprehensive list of areas where new knowledge is needed. They are mostly areas of new work suggested by studies of serious events carried out in the last few years that are not covered in earlier sections.

Motorcycle Accidents and Fatalities

The number of motorcycles used in the United States has continued to increase sharply over time. The number of registered motorcycles increased by 747 percent between 1961 and 1977. Several studies report high levels of alcohol presence in motorcycle fatalities, as great or greater than that found in other traffic accidents. The research of Baker and Fisher (1977) is of particular interest. The authors report that "between 3000 and 3500 motorcyclists die in the United States each year. The number of deaths per person-mile of travel is about seven times as great for motorcyclists as for car occupants." Given the limited protection motorcycles afford in an accident, prevention of accidents is of the greatest importance. In a series of accidents in Maryland, studied over a 2-1/2-year period, half of the drivers who were killed had BACs $>$.10. One hundred and three motorcyclists were killed—91 drivers and 12 passengers. The median age of fatalities was 25. Seventy-five percent were under 30 years of age. There is a need for control studies in this casualty area.

The Causal Chain and Traffic Accidents

Although the greater risk of traffic crashes with increasing BAC has been established, little is known about alcohol effects leading up to crashes. That is, little evidence exists of the causal chain and the role of alcohol in it.

In an especially important piece of work by Shinar et al. (1978), 420 traffic accidents were closely studied by an expert group of analysts (i.e., a traffic engineer, an automotive engineer, a sociologist or psychologist, and an accident reconstruction specialist) for causal antecedents of traffic accidents. In 86 percent of the cases, no causal chain could be determined. In those cases where causes could be assessed, 28 percent involved alcohol. This study attempted to discover the different negative consequences (e.g., fatigue, distractability) of alcohol that were at work in "causing" these accidents. The study in fact demonstrated the difficulty of reconstructing causal chains and the proportionately few cases in which the cause can be reconstructed.

Special Populations

Special populations are a particularly useful direction for new research. Perhaps the most immediate problem in the study of serious events is the design of methods of inquiry that do not depend on traditional forms of control groups. Pernanen (1976) argues, "Trying to get a representative sample of the population at risk is a rather wasteful way of gaining access to causal processes, especially if many of the causally relevant factors are relatively rare. It is in fact more fruitful to select small samples of theoretically relevant subgroups of the population for more intensive study." The difficulty lies in designing research of this kind that is not ad hoc but forms a cumulative research program.

In a recent study of alcohol involvement in crimes committed by blacks, we outlined at some length the need for studies of special populations (Roizen 1980). Black Americans commit disproportionate numbers of violent crimes. Evidence on drinking patterns suggests that, on average, blacks drink less than whites. When they drink heavily, however, they appear to have greater chances of negative consequences of drinking than do whites. The evidence suggests that this may be more closely related to drinking styles than to overall quantity and frequency of drinking. Blacks are more likely to drink heavily on an occasion, to drink in public settings, and to drink heavily on weekends. Further, ethnographic evidence suggests that ghetto taverns are the locus for coordination and planning of criminal activities, while at the same time serving as shelters for the temporarily or relatively permanently homeless. What is apparent from the evidence reviewed is that little is known about the drinking patterns and criminal behavior of this population which is greatly "at risk" of involvement in criminal events.

Two casualty areas point out a need for work on the accident risks not only of the elderly, but of older men and women generally. For example, pedestrian accidents occur disproportionately among persons over age 50 (Baker 1977). In a study of 71 cases of fatal cerebral injury among persons in Dallas aged 61 or over, Kirkpatrick and Pearson (1978) show that in 46 fatal falls, 7 victims were acutely intoxicated and 3 more had recently consumed alcohol. More needs to be known about the special risks of particularly vulnerable populations—not only the aged, but those who live alone or are liable for other reasons to be insensitive to the risks of falls, fire, and other accidents, especially (but not exclusively) in conjunction with alcohol consumption.

Problem drinkers (however defined) are a population that have received little attention in research on serious events. An especially important question for new research is the relationship between chronic and acute drinking problems. The evidence that does exist suggests that individuals involved in serious events who are also problem drinkers are significantly more likely than others to have been drinking prior to the event. Haberman and Baden's (1978) research on unnatural death shows that alcoholics and heavy drinkers are more than twice as likely to have measurable BACs greater than .10 when compared with nonalcoholics. This relationship of acute and chronic alcohol problems finds tentative support in studies of crime, suicide, and traffic accidents.

Perceptions of the Role of Alcohol in Serious Events

In our earlier work (Roizen and Schneberk 1977), we argued that new research was needed on victims' (and offenders') perceptions of alcohol's causal importance in serious events. In an analysis of drinking at the time of crime events, Washbrook (1977) reports data on perceptions of alcohol's importance as a cause of criminal behavior. While 54 percent of a sample of 5000 prisoners had, by their own admission, consumed alcohol within 24 hours of the offense, only 12 percent of these consumers felt that alcohol played a role in the commission of the offense; of these about one-third were diagnosed as alcoholics.

Locus of Alcohol-Related Violence

Gerson's (1978) study of alcohol-related violence and its locations is an important addition to the literature on alcohol and crime and suggests anew the importance of tavern studies. In the series of violent crimes studied, 13 percent of the alcohol-present crimes occurred in licensed premises. Twenty-seven percent of common assaults and 28 percent of assaults with injury occurred in licensed premises.

Drugs and Alcohol

The literature on serious events increasingly focuses on the interaction of drugs and alcohol, creating a need for carefully controlled studies of this problem. For example, Brandwin (1976) found 16 percent of his Michigan suicide attempters to have ingested both drugs and alcohol; Cameron (1978) found 45 percent of suicide attempts to be associated with the consumption of both alcohol and isoniazid. Garriott and Latman (1976), in a Dallas sample of those arrested for driving under the influence of drugs, found a large number intoxicated with more than one drug, most frequently alcohol, and suggest that drugs play a larger role in the intoxicated driver population than was previously recognized. The investigation of polydrug use is hampered by the greater effort required for toxicological drug tests than for alcohol breath testing.

Conclusion

This work updates the estimates of alcohol's presence across casualty areas with the studies that have come into the literature since 1976. We have used several different methods of calculating alcohol presence, arguing that none represents a "best" estimate. Estimates like these, we argue here and in the earlier report, must be used with caution. Even within a single casualty area, studies differ substantially in design and measurement. The study of alcohol's role in serious events is for the most part a very weak area of scientific inquiry—theoretically and methodologically. Yet within this area there are more and less reliable methods of estimating alcohol's presence and roles in the chain of events surrounding these casualties. We have argued for three types of estimates: range estimates narrowed to reflect the ranges of the middle half of all estimates; estimates based on the best designed studies in each casualty area even if these studies are deficient in themselves; and, where relevant, estimates based on control studies. As an area of scientific inquiry, the study of alcohol's role in these serious events will progress only if investigators attempt to build on the best knowledge at hand.

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Chapter 6

Alcohol and Family Violence: A Review of the Literature

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Abstract

Research concerned with possible links between alcohol and family violence have yielded contradictory and inconclusive results. Estimates of the number of people involved differ widely, ranging from 2 to 23 million victims of marital violence, for instance. Also lacking is any clear picture of the causal role that alcohol may play in these events; too often assumptions of causality rather than analysis have been presented in the literature. The research in this area could benefit from closer attention to research on alcohol's effects on mood and emotion, and alcoholism and family life, and the literature on alcohol's relation to violence and aggression.

Research in the area of child abuse and alcohol face similar difficulties. Recent studies estimate that there are over two million children in the United Stated who suffer some sort of physical or sexual violence from family members each year. The ascription of alcohol to these events, although sometimes acknowledged, has not been of central concern to most research in the area. Any findings remain inconclusive and suffer from the same assumptions of causality noted above.

The problematic state of scientific knowledge in this area generally provides the following observations. First, studies of family violence have not distinguished between alcoholism, alcohol drinking and the violent episode, histories of alcohol problems in the family, and different incidents of violence in the family. Second, there has been a tremendous growth recently in awareness of domestic violence, creating a myriad of services to victims, without a corresponding growth in scientific knowledge upon which to direct programs or policies. Third, research has not yet discerned the exact scope and depth of the problem, the community at risk, or even whether or not the problem is in fact increasing or remaining stable. Combined, these issues present a challenge in outlining the influence of alcohol consumption and abuse on incidents of family violence.

Introduction

Examinations of links between alcohol abuse and problems of family violence have produced varied and contradictory evidence. Arguments over the rate of alcohol-related domestic violence episodes stem from several sources. First, few linkages exist between the alcohol research community and psychosociological studies of family violence. Problems of specific historical circumstance or violent events have been overlooked in the alcohol studies research traditions. Studies of family violence have not distinguished between alcoholism, alcohol drinking and the violent episode, histories of alcohol problems in the family, and different incidents of violence in the family. Second, there has been a tremendous growth in the last 5 years of awareness of domestic violence—creating a myriad of services to victims—without a corresponding growth in scientific knowledge on which to direct programs or policies. Third, research has not yet discerned the exact scope and depth of the problem, the community at risk, or even whether the problem is in fact increasing or remaining stable. Combined, these issues present a challenge to outlining the influence of alcohol consumption/abuse on incidents of family violence.

The Extent of the Problem

Because the sanctity and privacy of family has traditionally been protected in American society, incidents of violence in the home are especially difficult to identify. For instance, the estimated female victims of marital violence range from 1.8 million per year (Straus et al. 1979) to 23 million (*Drug Survival News* 1979). Overall, according to a recent national sample, it is estimated that 28 percent of the adult population has been involved in physical violence at some time during their married lives (Straus et al. 1979). Marital violence can range from a single slap to aggravated assault to murder (Gelles 1972; Straus et al. 1979). Violent occurrences tend not to be limited to one episode (Truninger 1971), and these occurrences tend to happen across class, ethnic, and racial lines (Dobash and Dobash 1979; Stark and McEvoy 1970; Straus et al. 1979).

The ascription of alcohol to this problem has been contradictory. For example, Bard and Zacker (1974) report that alcohol use was involved in as few as 6 percent of marital violence incidents, while in a different study (Gerson 1976), alcohol was said to be involved in as many as 50 percent of the cases studied. The first study relied on the perceptions of trained police observers, the second on the wives of the batterers. Only one study reports separately data for violent husbands with histories of alcohol abuse, and, according to the perceptions, alcohol is present in 52 to 74 percent of the cases of wife battery (Gayford 1975*a*). Other studies are similarly varied and overall knowledge remains inconclusive.

In analyzing the problems of child abuse and neglect we are presented with similar difficulties. The *New York Times* (cited in Aarens et al. 1977) reported recently that almost 2 million children each year are kicked, punched, or bitten; approximately another half million are beaten up; and another 50,000 are attacked with knives or guns. Before 1968, however, only up to 6,000 cases of child abuse were authenticated each year (Gil 1968), and the rate of physical abuse to children in the population at that time was estimated at 8.4 in 100,000 (Gil 1970). The estimated rate and reported cases of both child abuse and neglect have increased since that time with the creation of the National Center on Child Abuse and Neglect in 1974 (Epstein et al. 1978).

Although it is acknowledged that alcohol is often linked to cases of child abuse and neglect, the evidence associating alcohol abuse or family alcoholism with the problem varies widely. Further, as Epstein et al. (1978) report, "Alcohol involvement in child abuse and neglect has not been of significant or central concern to researchers in the main body of literature on these topics." Generally, studies undertaken in the United States have reported that a history of drinking problems was present in as few as 7 percent of clinical abuse cases studied (Gould 1976) to as many as 25 percent (Johnson and Morse 1968*b*).

The History of the Problem—Wife Battery

Historical records describing physical abuse against wives have been documented as far back as ancient Greek and Roman civilizations, corresponding to the rise of societies in which the rights of male inheritance emphasized the need for a stable and secure family structure which, in turn, necessitated the complete subjugation of wives (O'Faolain and Martines 1974). When married, a woman, in essence, became the property of a husband's household, charged with the duty of producing legitimate heirs (Dobash and Dobash 1976). Under Christianity subjugation to one's husband became based on a new moral order which made obedience sacred. Both secular and canon law backed the use of force against "immoral" or unruly wives, up to and including the period of the Reformation. In the Middle Ages these were known as the "laws of chastisement," giving either husbands or the State the right to publicly flog wives who committed any number of offenses from adultery to public drunkenness.

Under the Protestant Reformation, the condition of women improved a bit in some countries, especially in the early American colonies. Although women were still legally under their husbands' dominance, a shortage of labor accompanied by a shortage of women led to a more lenient attitude toward property rights and divorce rights for women in the family. This included the right to "peaceful cohabitation" under which "husbands and wives were forbidden by law to strike each other, and the courts enforced the provision on numerous occasions" (Morgan 1944).

The rise of industrialization, the growth of urban centers, and a more isolated and mobile nuclear family furthered the isolation and dependence of women at the time when men were winning more rights and privileges under law. For the first time, laws were passed in the United States safeguarding a husband's right to chastise or physically discipline an errant wife (Morgan 1979). Husbands were seen as performing a "duty" or a "right" to chastise and punish, a system which was protected by laws against "excessive violence" in the home (Dobash and Dobash 1979).

Interestingly, the image of the battering husband as deviant began to emerge with the growth of the temperance movement in the 1830s. This period witnessed the beginnings of a separation between drinking and family life not found in earlier colonial periods. Where it was once common for entire families to enjoy the pleasures of a tavern which was also the center of social life, industrialization changed that entirely. Levine (1978) writes that "as the pace of rapidly developing capitalist society came to demand more and more organization and discipline in one's daily life, 'drinking times' came also to be a time to let go of the impulses and desires ordinarily held in check." The importance of self-control was the cornerstone of middle-class values in the 19th century, which led the temperance movement to view alcohol as destroying self-control and posing a threat to the family.

Importantly, however, alcohol and not men were perceived as the evil. This emerging social problem had one cause only—the use of alcohol. Men were seen as victims almost as much as women. Temperance crusades along with the nascent women's rights movement led, by the end of the 19th century, to changes in the law giving women some legal protection from physical abuse by their husbands (Morgan 1979). However, the problem of wife battery never became a public issue and by World War I had generally faded from public consciousness.

The reemergence of the "problem" of marital violence did not really take place until the 1970s, or late 1960s, and can be linked to the rise of the feminist movement in the United States and in Great Britain. Women began to be aware of the problem only after battered wives began calling rape crisis "hot lines" set up to help the victims of rape (Warrior 1978). Women's groups then formed to provide specific assistance for these victims and the shelter movement was started. Awareness of an association between alcohol and domestic violence reemerged more recently only after the shelter movement became established in many communities across the United States.

The History of the Problem—Child Abuse

The history of child abuse and neglect follows a similar course to that of marital violence. Prior to the late 1800s, generally throughout recorded history, the physical battering of children like that of wives was considered the natural duty or right of the male head of household. For centuries, infants and young children were beaten regularly "to keep them quiet," salted and swaddled (bound with tight bandages) to toughen them up and prevent them from "damaging themselves," mutilated, burned, frozen, or drowned. Children were often terrorized with practices designed to literally "scare the devil" out of them (DeMause 1978). Also, from antiquity children were often sexually abused by their parents or servants. Around the end of the 18th century, however, parents began punishing their children for evidence of young sexuality.

> By the 19th century, parents and doctors began waging a frenzied compaign against childhood masturbation, threatening to cut off the child's genitals, performing circumcision and clitorectomy without anesthesia as punishment, making children wear spiked cages and other restraints, and opening antimasturbation sanatoria all over Europe. (DeMause 1978, p. 12)

In the United States, by the 19th century, the physical abuse of children was paradoxically acknowledged as both a necessity and a terrible problem. Children were taught to be productive, self-controlled participants in the values of the work ethic. To this end, physical punishment which promoted this goal and combated "childhood idleness" was both necessary and virtuous (Keniston 1978). On the other hand, the public became aware of the excessive use of violence against children generally if it involved the use of alcohol by the battering parents. Because temperance thought considered the family to be most threatened by the use of alcohol, children as the helpless victims of its abuse were given as examples of the evils that could result from drink. Due to drunken fathers, children were neglected, starved, terrorized, and beaten (Levine 1978).

The temperance movement generally brought on an awareness of the importance of the family and for the first time such "personal problems" were developed into "public issues." By the time of the Progressive Era (1890-1920) middle-class reform efforts were providing havens for neglected, abused, or battered children (who were generally working class). Although these reform efforts centered primarily on providing services and institutions for reforming juvenile delinquents, the family as a center of conflict—at least among the working classes—was seen as a legitimate avenue of inquiry.

Although the Progressive Era set in motion structural reforms for family crisis intervention, child abuse as a public issue was buried for several decades. In the 1930s, problems again surfaced in the criminological literature generally in the context of sexual offenses (Lystad 1975). In the 1940s, knowledge of what became known as the "battered baby syndrome" was made public when development of the X-ray exposed hidden evidence of abuse (Epstein et al. 1978).

Summary

Most recently, questions of alcohol's involvement in both wife battery and child abuse have broadened, influenced partly by the ever increasing interest in the problem of family violence itself and partly by the increasing interest in the alcohol abuse and alcoholism treatment communities. This developing awareness has broadened inquiry into all phases of physical abuse within the family. For instance, the phenomenon of 'granny bashing' or elder abuse has attracted research studies in both the United States and Great Britain (Marsden 1978; *Newsweek*

1980). Services for victims of marital abuse have mushroomed in the last 5 years from fewer than a dozen shelters around the country to more than 300, along with crisis intervention centers and counseling programs, all sponsored by a wide range of private, religious, medical, legal, local, State, and Federal institutions and organizations (Morgan and Wermuth 1980; Warrior 1978).

Along with the growth of these services a conflicting set of institutionalized perceptions concerning the cause of the problem has also emerged (Pagelow 1977; Klein 1979). In particular, family violence services face a programmatic dilemma concerning service options based on confusion over common sense or cultural notions of the problem, and conflicting results of research findings. Also problems of marital violence enter the treatment service community in different ways, are subject to different methods of treatment, and get handled according to different sets of priorities and goals. It has been argued that professionals within institutions form their perceptions of a particular social problem, at least partially, from their structural location within the service community (Roizen and Weisner 1980). A police officer answering a domestic disturbance call, a worker in a shelter, or a staff member of a hospital emergency room are all likely to form separate perceptions of the cause, extent, and disposition of the same incident of family violence.

The issue of alcohol as an agent in the problem of family violence is subject to the same institutional and situational biases. Perceptions linking alcohol to the problem held within the alcohol treatment community are generally based in research on the physiological, psychological, or cultural effects of alcohol on the individual, on behavior, or on the family generally. These perceptions are also based somewhat on nonalcohol-specific research into the various problems of family violence. However, there has been little evidence to indicate that these two bodies of research have been systematically linked. Moreover, the alcohol treatment community has entered the debate over the cause of the problem, operating generally on the basis of already-worked-out models of treatment for alcohol abuse. When these models get applied to the particular problem of family violence, their effectiveness may get called into question. In sum, the complex problems of family violence comprise a range of issues that are not part of any established research base in the alcohol literature. However, the wide range of research on alcohol can form a legitimate base from which to build a framework for systematic research studying the links between alcohol and marital violence.

Alcohol's Effect on Mood, Behavior, Aggression, Violence, and the Family

A thorough understanding of the possible influences alcoholism and drinking problems might have on family violence necessitates an exploration of several separate and distinct bodies of literature. It becomes essential to understand, and to differentiate between, the effects that excessive alcohol use, alcoholism, and deviant drinking might have both on the individual and on the family. Questions concerning the relationship between drinking and mood change are as vital to our understanding of the problem as questions which explore the family environment. Because there does not exist a cohesive body of literature which explores the entire scope or depth of the problem, it becomes necessary here to create one.

In this section we explore the alcohol literature specifically, taking into account those bodies of research which have examined alcohol's effect on the individual or on the family which may account for some aspect of the relationship between alcohol and family violence. In general, this literature is not directly concerned with the problem of violence in the family, but links can be drawn showing the ways in which these studies can make a more direct contribution to our understanding of the problem.

Alcohol's Effects on the Individual

Mood and Emotion

Evidence in the area of alcohol's effects on mood and emotion in individuals has been sparse and conflicting. Studies have looked into a wide range of effects including depression, mood enhancement, aggression, and frustration, but generally have not included larger situational contexts of social groupings such as the family. They included several different research methods, including laboratory observations and general population surveys, furnishing data on: (a) the effects of ethanol upon mood and behavior, and (b) the possibility that mood affects drinking. Generally, clinical or laboratory studies focus either on the individual or on alcohol. Behaviorist studies have tried to measure alcohol's effect on human emotion by controlling the specific environment and in some cases the amount of alcohol consumed within a clinical setting.

Studies have gone in two different directions. In one set, clinical designs are set up to determine how different moods lead to increasing or decreasing consumption (Nathan and Lipscomb 1979; Nathan and Lisman 1976). These "mood stimulating" studies create a particular environment, form control groups in other environments, and measure the intake of alcohol. Other studies try simply to determine how a restricted environment could stem the development of particular moods or changes in them. Pliner and Cappel (1974) found, for instance, that group subjects tend to describe their intoxication in affective terms, solitary drinkers in physical ones. Allman (1971) finds the same true for alcoholics. In another set of studies Warren and Raynes (1972) report that among college students, social drinking produces a less favorable pattern of mood alterations—anxiety, hostility, aggression—than among solitary drinkers. Other "free drinking" controlled lab studies have tried to test variations in emotions (Caudill and Marlatt 1975; Mendelson and Mello 1979) as have a few "natural setting" observational studies (Cutler and Storm 1975; Kessler and Gomberg 1974; Reid 1978).

Problems associated with these studies concern the reliability and the validity of the data, conflicting categorizations of emotions, and conflicting reports of results (Marlatt and Nathan 1978; Nathan and Lipscomb 1979). The difficulty with the literature generally, however, lies in its ahistorical method of inquiry which removes both the individual and the family as important units of inquiry. Little attention is paid to past needs, motives, beliefs, or expectations which a subject brings into the clinical setting. The results of these controlled research studies, however, could be used to set up a typology of emotional patterns comparing family violence events, individual drinking habits, and mood or emotional changes.

Studies on the effects of alcohol on mood and behavior that focus on the individual rather than the alcoholic substance address questions of why some individuals respond to certain stimuli and not others in a controlled research environment (Russell and Mehrabian 1975). The emphasis is on what needs, motives, beliefs, expectations, or personal history the individual brings into the clinical environment. Even though many of the results of these studies could be applied in an analysis of the family, research designs are usually limited to particular individual characteristics. For instance, studies geared toward the 'tension reduction' effect of alcohol attempt to prove or disprove it as a motive for drinking (Williams 1966; Zuckerman and Lubin 1965). Contradictory findings have prompted some to argue that problems lie in looking for direct causality (Buckley and Milkes 1978), or that the subjective nature of the alcohol intoxication experience should begin to link self-reporting accounts of motive and effect (Freed 1978). Russell and Mehrabian (1975) find that motivations for drinking are linked to both needs and mood, while Majczak (1968) suggests that postdrinking moods are of secondary importance to predrinking moods. Both ideas have yet to be applied to studies of domestic violence, especially designs which compare separately alcoholism and deviant drinking patterns to the problem.

Studies utilizing the balance placebo design argue that motivations and effect are linked to expectations. In looking at aggressive behavior, Lang et al. (1975) found expectancies to be a significant factor in aggression: "The most important finding. . .was that differences in the level of aggression observed were determined largely by subjects' expectations or belief about the content of the beverage they had consumed.'' Those who thought they drank alcohol were more aggressive. This finding has been supported by others (Schacter and Singer 1962; Wilson and Lawson 1976) who also found that effects of alcohol on a variety of emotions were mitigated by the subject's belief that alcohol had been administered. Questions should then be raised on a variety of methodological fronts. The simple cause and effect methodology of the behaviorists becomes especially blurred when the relationship between the emotional phenomenon and alcohol remains unclarified (Freed 1978). Further, Curlee (1972) argues that the diversity of moods and emotions produces a need to scrutinize their individual source. The methodological limitations inherent in controlled clinical settings thus restrict interpretations concerning the underlying mechanisms behind individual beliefs, motives, expectancies, or needs which could begin to close the gap between pre- and postdrinking behavior. These controlled studies thus limit the focus of inquiry to situations that cannot account for larger cultural or social impacts—impacts which may, in fact, account for links between alcohol and mood changes within the family environment.

Research on reasons or motivations for alcoholism or alcohol use have also included general population surveys (Cahalan et al. 1969; Mulford and Miller 1960). The varied reasons given for drinking were often used as measures of motivation, which could then be used to explain particular effects including aggression or violence. Some studies (McClelland and Wilsnack 1972; Roizen 1975), for example, focus on beliefs or motives as unfixed perceptions that make a drinking experience meaningful or comprehensive. It is now being argued, however, that such survey data cannot provide accurate information on fundamental motives, because they partially reflect culturally accepted accounts of behavior (Roizen 1975).

MacAndrew and Edgerton (1969) offer a cross-cultural observational study of alcohol's effects on human emotions and behavior. Covering a wide range of cultural groups, they report that intoxicated behavior stems from societal needs to provide sanctioned and continual release from everyday norms and values. The wide variety of drunken behavior studied corresponds to the cultural milieux in which they occur.

Problems in these studies generally include a lack of empirical verification. Both general population studies and observational techniques cannot offer operational definitions of everyday beliefs. Laboratory studies, on the other hand, assume beliefs, and take for granted that they are sufficiently established. Personal history studies direct attention too much to the self, and general population surveys to attitudes toward general practices. When these methods are applied directly to questions of alcohol-linked casualties, such as family violence and mood or behavior changes, additional problems can be identified.

Alcohol and Aggression

Of special importance to a study of family violence is the research on the relationship between alcohol and aggression. The focus of these studies tends to be on behavior rather than on mood or emotion. Research covers a wide range of settings which includes psychological experiments, anthropological descriptions, medical studies of brain patterns and injuries in alcoholics, as well as longitudinal studies (Pernanen 1976).

Laboratory studies on alcohol use and aggression have followed three basic forms of analysis: direct cause, conditional, and situational. Direct cause studies have tried to posit a direct relationship between alcohol consumption and aggression. Studies on human subjects have been based on designs measuring aggression according to specified amounts of ethanol in the bloodstream, or on designs that studied the relationship between types of beverage (most often beer vs. distilled spirits) available to subjects on a free choice basis and perceived aggression (Boyatzis 1974; Shuntich and Taylor 1972; Takala et al. 1957). Boyatzis (1975), for instance, found that persons who had a history of arguments and aggressive acts, and who scored low on measures of socialization, were more apt to display aggression after heavy drinking. However, Persky et al. (1977) in a controlled study failed to find a significant correlation between aggression and alcohol intoxication using a variety of measures. The uncertainty of these and other results seems to point to the problem of controlling for the nature of the independent variable in human behavior. As Pernanen (1976) argues, "a great drawback of the direct cause paradigm is that it tends to draw attention from the need for a systematic variation of potential conditional factors": conditional factors which would include behavior in particular groupings such as the family.

Some laboratory studies have focused on limited conditional factors attempting to link the importance of intoxicated aggressive behavior to coping mechanisms employed by the individual. Jellinek and MacFarland (1940), for instance, tried to show that intoxicated coping devices were determined by the immediate situation. For others, the chain of events immediately leading up to the violent or aggressive act are the most relevant situational variables (Wilsnack 1974; Mayfield 1972).

Research designs that focus on the nature of conditional variables also tend to see social settings and emotional states as relevant for examining alcohol use and aggression. Items such as male drinking company (Carpenter and Armenti 1972), frustrating or stressful stimuli (Boyatzis 1974, 1975), and cognitive structures have revealed the importance of testing for differences in social settings. However, the as yet undetermined link between emotional or stressful states and aggressive behavior has stymied systematic analyses between social settings, aggressive behavior, and alcohol use. Further, these studies generally have not taken into account the family as a *particular* social setting from which to study these links.

Observational and general population studies on alcohol and aggressive behavior have tended to follow along the same lines of research employed in studies of alcohol's emotional effects. The two prime examples of observational approaches are tavern studies and anthropological studies of a variety of primitive cultures (MacAndrew and Edgerton 1969; May 1973). One focus of aggressive behavior examined through observational methods is the study of the escalatory process of behavior patterns resulting in violence (Aho 1967; Mayfield 1972; Washburne 1961). In none of these studies has alcohol been definitely linked to the process of escalating violence, and systematic attempts have not been made to use these useful data to study domestic violence specifically.

General population surveys, on the other hand, have relied on self-perceptions of intoxicated aggressive behavior (Cahalan 1970). In a re-analysis of O'Donnell et al. (1976), Aarens et al. (1978) report that 9.3 percent of heavy alcohol users in their sample related belligerence to alcohol use, and 43 percent of the heavy users reported physical fights occurring as a result of drinking. However, as mentioned above, there is little empirical verification of these self-reported perceptions, and no attempt to include the family as a particular environment from which verifications can be made.

Alcohol and Crimes of Violence

Research into the cause of violent crime has revealed some association with the use of alcohol. It also has been revealed that most crimes of violence occur in the home. However, most of the studies in this area have been undertaken by criminologists who were not primarily concerned with either alcohol or the family environment, but with the criminal offender. In these studies, alcohol is but one variable used to test behavioral explanations for crimes of violence. Thus research has been guided by an empiricism which tends to focus specifically on the violent criminal act and on the conditions or events that may have caused the criminal behavior. Researchers disagree over the role of alcohol, and data from prison population studies and court or police records are varied.

Wolfgang (1958) and Wolfgang and Ferricuti (1967) have provided perhaps the most systematic analysis into the association between alcohol and crimes of violence which has framed the design of subsequent research. In one study of 588 criminal offenders, Wolfgang (1958) found that alcohol was present in both victim and offender in 43.5 percent of homicides. Voss and Hepburn's study (1968) of 395 criminal homicides found alcohol present in 53.5 percent of the cases. Most researchers disagree, however, on the nature of the association between drinking and violent criminal acts. Winkler et al. (1954) state that the cause and effect relationship has been exaggerated, while Scott (1968) argues that "acute alcohol intoxication" has been found in a significant number of cases of violent crimes. In this he is supported by Baker (1959), Mayfield (1972), and Banay (1942). Underlying these arguments is the belief that both criminal and drinking behavior have a common cause in the psychic disorganization of the individual.

Complementing these studies, and of particular interest to family violence research, are the findings of Wolfgang (1958) and others who found that the most common location of homicide was in the home. Curtis (1974) shows, for instance, that 73 percent of all homicides were committed against family members or intimate friends; alcohol was present in about one-half of these cases. Other studies have replicated Wolfgang's findings and have shown an association between alcohol and homicide taking place in "personal" environments (Mayfield 1972; Pokorny 1965; Voss and Hepburn 1968).

Others have found a relatively high rate of aggravated criminal violence in drinking situations (Mayfield 1972; Pokorny 1965; Pittman and Handy 1964). However, the existence of an association between alcohol and violent crime does not show alcohol to be a cause. Research shows that a wide variety of contextual settings, behaviors, and demographic variables that can be associated with criminal violence and drinking have not been systematically explored, especially the home or family environments.

There has been a tendency to cite this research as evidence, however, in discussions on family violence (Gelles 1972; Martin 1976). The problem here is twofold. First, although causal claims are often implicit in the structure of the research, these studies themselves have actually been "associational" rather than causational. According to Roizen and Schneberk (1978), "The question which must be asked of this alcohol/crime data is whether crime, or some aspect of crime, can reasonably be called a consequence of drinking or a drinking problem." Second, this danger is magnified by the atheoretical nature of the alcohol/crime research. The absence of a general theory of alcoholism or alcohol problems has placed several restraints on the collection of data about criminal events, and the alcohol literature has been largely ignored. Furthermore, this research is not generally associated with specific criminal theories. Instead, a kind of implicit theoretical link between alcohol and criminal acts has been made but never articulated. When used as an explanation of cause in domestic violence studies, the information from this research runs the risk of being elevated to a theoretical paradigm on the strength of its associational claims alone. Thus, although useful in explaining rates of alcohol use among violent criminal offenders, this body of research should not be taken as proof of cause. However, studies are needed which systematically examine both the family environment and the history of drinking in persons convicted of violent crimes.

Theoretical Perspectives

There are basically three specific theories guiding the research on alcohol's effects on the individual—disinhibition, pathological dysfunction, and time-out behavior—which have had an impact on perceptions linking alcohol to family violence. The most common portrayal of alcohol's relationship to emotion and aggressive behavior lies in the theory of disinhibition, which posits alcohol as an agent which somehow releases individual normative controls. Alcohol can thus be said to "weaken" inhibition or self-control (Fitzpatrick 1974; MacDonald 1961; Roebuck and Johnson 1962). The cause of aggression could be deep personality features particular to the individual (Hopwood and Milner 1940), or reside in the substance itself as a direct cause of aggressive behavior (Blumer 1973; Brill 1970; Glatt 1965). Paradigms which focus on the substance fail to address the question of why alcohol induces violence in some, while for most people, aggression is not the result of alcohol consumption. Disinhibition perspectives which focus on a variety of individual factors compare inhibited and disinhibited states, arguing that aggression is the result of alcohol consumption only for those individuals who are "aggressively inhibited" (Carpenter and Armenti 1972; Hetherington and Wray 1964).

The problem in theories of disinhibition lies in the descriptive operationalization which equates disinhibition with aggression. MacAndrew and Edgerton (1969) have noted, for instance, that disinhibited behaviors are as likely to include kissing, hugging, and singing as violence or aggression. And Pernanen notes that part of the reason for the popularity of the disinhibition theory is that, as a broad descriptive concept, it can fit into almost any mode of analysis. Despite these weaknesses the disinhibition model has had an impact on family violence research and is mentioned as a partial explanation of wife battery in most of the popular literature (Langley and Levey 1977; Martin 1976).

The dyscontrol syndrome, or pathological dysfunction paradigm, offers a more recent explanation for the relationship between drinking and violent behavior. Mark and Ervin (1970), who have developed the theory of a dyscontrol syndrome, argue that the relationship between alcohol and aggressive behavior does not lie within short-term disinhibition, interactional, or situational perspectives. Instead, they posit a long-term explanation for the relationship which resides ultimately in the individual. The dyscontrol syndrome is found in individuals possessing certain characteristics: impulsive sexual behavior, a history of assault, pathological intoxication, and a history of traffic violations and auto accidents (Mark and Ervin 1970). The basis for these characteristics is apparently internal brain abnormalities. They argue that in certain stressful situations, alcohol acts as the trigger for aggression in these individuals. The problem for a study of domestic violence in particular is that it focuses primarily on the intoxicated condition without separating out the series of events within particular societal or cultural norms—events which may or may not lead to aggressive behavior. Several studies of child abuse specifically have utilized this analysis to the exclusion of other social or environmental factors. In the long run, however, it has been argued that any theoretical approach which excludes larger social or cultural environments will not lead to a better understanding of the cause of the problem (Gil 1977).

A time-out theory of alcohol's effects on emotion and behavior has been advanced by MacAndrew and Edgerton (1969). They argue that behavior can be culturally determined according to the normative prerequisites set out by different societies. Each culture, they state, creates a time-out milieu within which people can be freed from the normative restraints of everyday life. Drunken comportment can represent one such time-out frame, the behavior of which varies considerably from culture to culture. These authors question whether alcohol can be a toxic disinhibitor if a range of societies exists wherein drunken comportment "(a) manifests *nothing* that can reasonably be classified as 'disinhibited'; or (b) is markedly different from one socially ordered situation or circumstance to another?" In support, Levine (1978) argues for a historical dimension to the time-out perspective. He found colonial drinking behavior to be classified as nondisinhibiting, while in the 19th century drinking habits became linked with problems of self-control. He argued that this change was caused by normative shifts emerging in a newly industrializing society. Partanen (1977) has also formed a materialist time-out historical perspective which suggests a link between drinking effects and a group's material conditions in society. These latter studies are among the few to present the possibility that any association between drinking and violence may in fact be merely coincidental (both occurring in the same situation or person), or that alcohol may even prevent aggressive acts from occurring. Little other research in the cultural or historical development of perceived effects has been done, but the issue seems to offer promise, particularly for future research on the relationship between family violence and alcohol use.

History of Alcohol and the Family

Discussions on the impact of alcohol use on family life can be traced through the literature for several centuries. Depending on the needs of a given society, alcohol was viewed as either the "good creature of God" or the "Demon Rum" (Levine 1978), seen as representing an integral part of family life or a particular time away from the family, a "time out" separate from family obligations (MacAndrew and Edgerton 1969).

Psychosocial inquiry into the relationship of alcohol to the family, in the 1930s and 1940s, focused primarily on the relationship between alcoholism, rather than alcohol use per se, and particular problem conditions such as the influence of alcoholism on the children, psychological disorders, and role behavior. A disproportionate amount of research centered on the wife of the alcoholic, and was concerned with the particular "character disorders" present in women married to alcoholic men. In clinical studies these women were characterized as being aggressive (Lewis 1937), dependent (Price 1945), domineering or emasculating (Whalen 1953), hostile (Baker 1941), or unconsciously encouraging their husband's alcoholism (Futterman 1953). Termed the "disturbed personality theory," these studies were criticized for being little more than clinical observations which had not included a comparison of wives of nonalcoholics, and because it was "not possible to know whether the wives described. . .[were] representative because of the inadequacy of our knowledge about the total population of alcoholics" (Edwards et al. 1973).

A competing framework appeared with the development of Jackson's stress theory of alcoholics' wives (1954) which focused attention toward the idea that the characteristics found in wives of alcoholics are a result of different stages in a process of adjustment to living in a family with an alcoholic husband.

Generally, however, the literature on wives of alcoholics has focused on the *patterns of response* of the wife to the husband's alcoholism, with little mention of behavior patterns or particular events attributed to the husband himself. Thus, studying the wives of alcoholics as such offered little fruitful data for a broader understanding of alcohol's role in family violence.

Another body of literature on alcohol and the family has been generally concerned more with the process of family interactions. This literature has focused on three related aspects of interaction: functional interactions, interpersonal interactions, and general marital conflict.

The first approach views the interactions between spouses as a "functional" necessity to patterns of individual alcohol use within the family. Ewing and Fox (1968) state, for instance, that "in alcoholic marriages a homeostatic mechanism is established which resists change over long periods of time." Variations in role behavior of either spouse can be viewed as a bargaining mechanism which functions to maintain the family system (Steinglass et al. 1971). Family members are viewed as component parts of the system whereby "drinking may constitute an integral part of one of the working programs within the system" (Ablon 1976). In addition, alcohol drinking patterns may have "adaptive consequences" for the family (Davis et al. 1974), and a "dysfunctional" behavior may produce corresponding dysfunctional behaviors on the part of other family members (Bowen 1974).

The interpersonal-interactionist approach studies the process of communication dynamics between family members. Gorad (1971), for instance, found competition to be the main style of communication between spouses in an alcoholic marriage. Studies also include particular patterns of role behavior among wives which have been characterized as either submission (Kogan and Jackson 1963), or dominance (Mitchell 1959), and among husbands, which include irresponsibility, lack of self-confidence, overdependency, sense of inadequacy, and relating superficially to others (Cork 1964).

These two frameworks come together in clinical studies of general marital conflict (that is divorced from violence or abuse) as a mode of interaction between spouses in alcoholic families. Compared to a control group of nonalcoholic marriages, Bullock and Mudd (1959) report a higher degree of conflict existing for longer durations in alcoholic marriages. They argue that the wives of alcoholics tended to cite their husband's drinking as the cause of such conflict. The results from an MMPI control study (Ballard 1959) showed that conflict in the alcoholics' families was more resistant to change. In addition, Bailey et al. (1965) report that conflict was not only more pronounced in alcoholic families but tended to be characterized as everything from physical or verbal abuse to silence or moodiness.

Overall there has been agreement in the literature that alcoholism places a significant amount of stress on the family. Economic, social, and emotional crises stemming from this stress result in a myriad of social problems. However, these are not immediately identified in the alcohol literature or directly explored by studies in family violence. In the alcohol literature, specifically, significant breakthroughs have been hampered by a mode of inquiry which has focused primary attention on the problem of alcoholism (to the exclusion of deviant drinking patterns or events) or the wife of the alcoholic.

The wife, moreover, exists within a particular framework. In viewing the wife as a victim of the condition, most studies have neglected the overriding questions of the wife's position in the work force and the changing nature of the nuclear family, which have an important bearing on questions of alcohol and the family. Furthermore, there has not been a link to the more recent sociological research on the family. Finally, this body of literature has made little systematic connection to studies of the effects of alcohol on behavior or emotions, studies of alcohol and aggression, or studies of domestic violence.

Another focus on the relationship of alcohol abuse to the family centers specifically on the children, and has tended to develop within both biogenetic and psychosocial models. First, there have been attempts to study the likelihood of alcoholism's being transmitted from the parent to the child. The second focus has been primarily on the psychological, social, and medical problems found in children of alcoholics.

The first focus, on the transmission of alcoholism from parent to child, bears no direct relationship to a study of the relations between alcohol and child abuse or neglect. However, the two primary modes of methodological inquiry parallel those found in the abuse literature: that is, are abused children likely to grow up and become abusers themselves?

Research which focuses on the problem of transmission of alcoholism from the parent to the child yields what appears to be strong evidence of an association. Estimates claim that from one-fourth to one-half of all alcoholic persons have had either a parent or another close relative who was an alcoholic (Bosma 1975; Fox 1968). According to Globetti (1973), children of alcoholics are more than twice as likely as others to become alcoholic as adults.

Research attempting to find causal relationships has followed two opposing methodological lines of inquiry: the debate over nature vs. nurture. The first, twin studies or adoption studies and other genetic studies, for the most part have argued for a higher probability in the transmission of alcoholism based on biological or genetic factors (Nordmo 1959; Partenen et al. 1966). Some comprehensive studies seem to have successfully concluded that there was no basis for the genetic theory of transmission of the disease of alcoholism (Nylander 1960; Roe 1944). Others argue that the transmission of alcoholism from parent to child is in essence a learned behavior found within the family environment. And still others have found evidence supporting a combination of family environmental and genetic elements (Goodwin et al. 1974; Schuckit 1973).

The second major focus on children is concerned generally with the behavioral and psychological effects of alcoholism in the family. It was generally found that children of alcoholics tend to develop more problems—in school, with the courts, etc.—than those who have nonalcoholic parents (Haberman 1966; Whalen 1953); that delinquent boys do tend to have alcoholic fathers (Channing 1927; MacKay 1961); that often children of alcoholics tend to develop personality traits similar to those of their alcoholic parent (Aronson and Gilbert 1963); and that such children often suffer from low self-esteem (McLachlan et al. 1973). Chafetz et al. (1971) also found that children in alcoholic families were more likely than a control group, to have experienced a variety of problems such as poor relationship between parents, serious illness or accidents, school problems, and adolescent problems with the police or the courts. In a study which did not include a control group, Cork (1969) found that children with alcoholic parents generally were defiant toward authority (50 percent), lacked self-confidence and felt rejected by their parents (90 percent), and had lost respect for the alcoholic parent (70 percent).

Jacob et al. (1978) reviewed a significant number of studies on the relationship between family alcoholism and children and concluded that evidence of psychological, social, or familial dysfunctioning found in children must be considered inconclusive. First, although evidence suggests that most children of alcoholics encounter more difficulties, there were a number of studies reporting little difference in overall psychological or social problems between groups of children with alcoholic parents and those with nonalcoholic parents (Kammeier 1971; Mik 1970). Second, methodological inconsistencies require further research. Jacob et al. (1978) stress:

> . . .this literature has been psychodynamically oriented and focused on individuals. Despite their implied interest in interaction and interpersonal relationships, most of these investigations have described and analyzed individuals. . .the interaction of a family system comprised of interdependent, reciprocally influencing members has been overlooked. (p. 1243)

Summary

Research in the area of alcohol's relationship to the family has focused on the presumed condition of alcoholism to the exclusion of a study of "events" except as a symptom of the alcoholic condition (Roizen 1975). The importance of focusing alcohol problems on events lies in the relevance of broadening the theoretical questions to include a historical perspective. Such an expansion thus broadens the relevant questions which can be addressed. As Aarens et al. (1978) state:

> . . .the event can be viewed in terms of supernatural intervention or natural causes; as inevitable, as justified by offsetting gains, or as preventable; as an isolated occurrence, as part of a chain or pattern of events, or a symptom or indicator of an underlying condition; as due to physical causes, to human error or failure, or to malice. (p. 3)

Thus, the phenomenon of marital violence when noticed at all in the literature on alcohol and the family has been reduced to an example of the systematic condition of alcoholism within the family.

Alcohol's Relationship to Family Violence

Studies undertaken to determine the impact of alcohol abuse on violence in the family have generally not worked expressly from specific theories of alcohol's effects on mood, emotion, or violent behavior, or from the literature of alcoholism in the family. However, they have carried with them implicit assumptions from that literature.

Evidence has stemmed essentially from two sources: first, from studies on alcohol that focus on the family as a specific unit of analysis; and second, from psychosocial studies of family violence in which an alcohol component is included (Byles 1978; Gelles 1972). Three general theoretical assumptions can be found in the literature on both marital violence and child abuse.

The first theoretical assumption is that alcohol is a disinhibitor and acts in a variety of ways to promote violence in a family context. In some cases, it is argued that disinhibition occurs only in certain individuals who are predisposed to violence.

The second assumption is that the family system itself produces conditions which predispose members to violent actions against other members of the family. In this situation alcohol may or may not have a disinhibiting effect, but is secondary to those predispositional conditions. In some cases, it is argued, alcoholism itself produces strain on family interactions which in turn leads to violence (Shapiro 1975). Problems of alcoholism in the home occur when there is a disruption of family functioning (Cork 1969; Cross 1968), or when partners are fighting for control (Fox 1968). In others, it is argued, incidents of intoxication can provide the vehicle from which conflict occurs (Steffen 1978; Wertham 1972).

The third assumption is that we live in a culture of violence in which the intimate setting of the family acts as a particular locus for violent acts to occur (Gelles 1972, 1978). Alcohol can be seen as the trigger to violence, or as an excuse for violent behavior. Although proponents of this theory argue that the exact relationship of alcohol to the "culture of violence" assumption needs to be worked out, there have been no clinical or general population studies which have attempted to do so.

Finally, there is a small body of research which has argued that the relationship between drinking or alcohol problems and violence in the family has been overestimated (Bard and Zacker 1974) or remains unclear (Stewart and Deblois 1978). In any case, these three tacit assumptions, in one form or another, are found in most of the literature on child abuse and marital violence. In many cases assumptions being drawn in the family-specific literature are based on psychosocial studies which did not include alcohol as a primary focus and where evidence remains inconclusive.

Child Abuse and Neglect

Most of the research undertaken to determine the caise amd prevalence of child abuse has not focused specifically on alcohol. Abuse itself is recognized to take many forms: physical abuse, neglect, and sexual abuse. Studies of child abuse can be broken down into three basic theoretical components; first, psychological studies which center primarily on individual behavior; second, psychosocial studies of interpersonal interactions among family members; and third, macro-environmental studies of cross-cultural, national, or social settings larger than the family unit.

Psychological research that focuses on the individual has included clinical studies which have attempted to determine particular personality disorders that might lead to violence against children. Attempts have been made to link parental psychosis to child abuse (Miller 1959; Simpson 1967). Other studies have found particular emotional disorders among child abusers such as frustrated dependency needs (Menick and Hurley 1969); histories of mental illness (Baldwin and Oliver 1975; Gil 1970); or histories of criminal behavior (Gil 1970; Scott 1973). Other personality deficiencies revealed by these studies are lack of identity (Elmer et al. 1967; Steele and Pollack 1968), unmet dependency needs (Court 1970; Kempe 1973), and impaired impulse control (Blumberg 1977; Margrain 1977; Smith and Hanson 1974). In clinical studies using control groups there seems to be general agreement that "abusing parents exhibit considerable psychological dysfunction when compared with control groups" (Maden and Wrench 1977).

Alcohol figures into these studies in a variety of ways. Alcoholism has been included in several clinical studies of psychiatric dysfunction and found to be associated with child abuse (Blumberg 1974; Fontana 1973; Johnson and Morse 1968*a, b*; Starr 1976; Wertham 1972; Young 1964). Other studies have found little difference between the target population and control groups (Steele and Pollack 1968). There have been few studies, however, discussing whether alcoholism is considered to be a manifestation of deeper personality dysfunctions, or whether it is accepted as an example of such a disorder.

Of the individually focused studies which do report some correlation between alcohol abuse and child abuse interesting results can be found. For instance, researchers have noted that some personality characteristics and disorders found in alcoholics and child abusers are similar (Fox 1962; Spinetta and Rigler 1972). Mayer and Black (1977) report that recognition of an alcoholic's drinking problem often helped reduce the abuse of children. None of the abusing alcoholic parents in their study were in treatment when the abusing occurred.

Problems in this area of study which focuses primarily on individual psychological disorders contain both methodological and theoretical components. Methodologically, Harley (1979) notes that the research to date has focused "on a small number of cases selected mainly because they have come to the attention of social service agencies." Other limits include the relatively small sample size of most studies and the absence of adequate control groups. Also, Epstein et al. (1978) observe that in studies which derive their target groups from treatment agencies, "much of this information (especially alcohol involvement variables) is based on general observations and impressions of the worker, and thus it is difficult to determine the accuracy of this material."

Some of the theoretical limitations are endemic to studies that attempt to emphasize one factor over all others. Thus, it has been argued that early childhood experiences play only a minor role in parental violence (Goldstein 1975); that theories of aggression and child abuse have generally borrowed from several psychological approaches, are too eclectic, and produce inadequate evidence or explanations (Allan 1978); and that none of these theories can account for all instances of parental violence because they do not account for the "complex interaction of individual, environmental, and interpsychic factors" (Allan 1978).

The second set of studies, both survey and clinical, examine interactional factors in the family which may lead to child abuse. These involve parent-child relationships where several stress factors may be important, such as the number of children in the household (Straus et al. 1979), and stress related to the health and age of the child (Baldwin and Oliver 1975; Smith and Hanson 1974; Light 1973). The social functioning of the parent has also been examined and has yielded contradictory results. Some studies show a substantial amount of marital discord between parents (Fergusson et al. 1972; Smith and Hanson 1974), unequal sharing of power in the home (Straus et al. 1977), and punitiveness (Elmer et al. 1967). Other studies report that "the marital situation of abusing families may not be significantly different from non-abusing families drawn from the same socioeconomic class" (Maden and Wrench 1977).

Often theories examining the social maladjustment of the family refer to alcoholism or excessive drinking as a symptom of familial stress or social disorder (Johnson and Morse 1968*a*). In studies of children of multiproblem families, alcohol involvement has generally not appeared as a significant factor (Booz-Allen & Hamilton 1974). However, in studies of "families in conflict," alcohol abuse, child abuse, and marital violence are all found in single families, leading Hindman (1977) to argue that "violence is not an isolated phenomenon, affecting only one victim in a family." Scott (1974) reports that both victims and perpetrators of marital violence are often parental abusers themselves. This has been supported by others (Spieker and Mouzakitis 1976; Stewart and Deblois 1978).

Unfortunately both levels and significance of alcohol-related child abuse in studies of interpersonal interactions have never been directly or thoroughly examined. Further, in studies where alcohol involvement is discussed, there seems to be no conclusive evidence beyond description. And, finally, there also appears to be conflicting evidence generally found between larger general population surveys and clinical studies (Spinetta and Rigler 1972).

The third theoretical approach involves studies of environmental factors which include cultural, national, economic, and racial examinations of cause. The purpose of studies in this area has generally been to determine the rate of child abuse either generally or among different groups in society (Lystad 1975). Evidence has generally shown that violence against children is not limited to one particular class, race, economic, or geographical group. Research has shown it to be as prevalent in European countries (Kaiser 1977). In addition, studies linking alcohol use to child abuse and neglect in Europe have yielded comparable results to U.S. data. In fact, Spieker and Mouzakitis (1976) report that "most empirical studies linking alcoholism with child abuse have been pursued in Europe." Epstein et al. (1978) show that studies of alcohol involvement or a history of drinking problems in Europe tend to show a higher rate of correlation to incidents of child abuse than comparable U.S. studies.

Within the United States, child abuse is reported to be slightly higher in large urban areas (Straus et al. 1979). Gil (1970) reports a higher rate of child abuse among blacks, but this was discounted in a later study by Straus et al. 1979). Studies conducted by both Gelles (1972) and Gil (1970) found class differences, but Eron (1963), to the contrary, found few differences in socioeconomic variables.

Alcohol use and drinking problems have played a peripheral role in these studies which have been mostly surveys designed to locate prevalence and rates among the general population. Alcohol measurements, when included, have varied considerably and thus the results have also tended to be inconclusive. Rates of alcohol involvement have varied from 7 to 37 percent (Epstein et al. 1978).

The implications drawn from these studies, however, have pointed to interesting and provocative paths of inquiry for future research efforts. Gil (1977), for instance, writes:

> The most fundamental causal level of child abuse consists of a cluster of interacting elements, to wit, a society's basic social philosophy, its dominant value premises, its concept of humans; the nature of its social, economic, and political institutions which are shaped by its philosophy and value premises, and which in turn reinforce that philosophy and these values; and, finally, prevailing in the society, which derives from its philosophy, values, and institutions. (p. 189)

Child Neglect

Throughout most of the literature, child abuse and child neglect are indistinguishably linked. The rationales for doing so are numerous. Fontana (1973) argues that the distinction is of little value to a child seeking help; and Epstein et al. (1978) point out that because they are both often considered as one event having similar causal typologies, most of the theoretical and empirical literature does not differentiate between the two. Polonsky (1978) argues however that until they are approached separately there will be no way to determine differences in treatment, policy, or identification. "Commonalities between the two should be empirically demonstrated rather than presumed."

This argument becomes especially effective when one examines the alcohol literature. It has been argued, for instance, that research has shown that child neglect has been found to be more pervasive than abuse in alcoholic families (Spieker and Mouzakitis 1976). However, Black and Mayer (1980) found no differences in the frequency of child neglect or abuse cases in families with an alcohol- or opiate-abusing parent.

It has also been argued that situations found in alcoholic families are simply unique and may not correspond to family abuse situations where problem drinking is not present. Shapiro (1975) states, for example, that "the non-alcoholic parent becomes obsessed with the problem and has no energy left to care for the children. Frequently, the entire family becomes preoccupied in dealing with the alcohol problem and many responsibilities are neglected." Other reasons for separating abuse and neglect in situations which involve alcohol abuse are reasons of intent, and the particular psychopathology of the problem drinker. Unfortunately, most of the research to date has neglected to separate the two problems when empirically testing the relevance of problem drinking or alcoholism in the family.

Sexual Abuse

The literature connecting alcohol to child sexual abuse includes both incest and child molesting (Epstein et al. 1978). Child molesting that takes place outside the family will not be covered here. We will concentrate primarily on the problem of incest.

It has been estimated that there are more than 100,000 cases of incest in the United States each year (Giaretto 1976). Awareness of the problem and the reported number of cases have increased substantially since the establishment of the National Center on Child Abuse and Neglect in 1974. This leads Epstein et al. (1978) to suggest that any estimates of incidence rates reflect the "degree of concern with the problem more than its actual prevalence."

In the literature on incest generally we find that the focus on alcohol involvement has been included with other factors of explanation. In a review of research on the prevalence of alcohol involvement in incest offenses, Epstein et al. (1978) found that generally alcohol was involved at a higher rate than reported for child abuse. Frosh and Bromberg (1939) reported a 29 percent involvement, Gebhard et al. (1965) 39 percent involvement, and Virkkunen (1974) 40 percent. In addition, studies which included a history of drinking problems found the rates to be even higher for incest offenses compared to other sexual offenses against children. A history of drinking problems was present in cases ranging from 35 percent (Frosh and Bromberg 1939) to 70 percent (Glueck 1956). In a study which compared incest offenders with other child molesters, Apfelberg et al. (1944) found that incest offenders showed a higher proportion of alcoholics and those drinking at the time of the offense. This has been shown by others as well (Frosh and Bromberg 1939; Glueck 1956).

Few studies have attempted to link various psychosocial factors to alcohol involvement in this area. Those that have generally centered on the individual psychology of the offender. Frosh and Bromberg (1939) reported that drunkenness was often used as an excuse by the perpetrator. In addition, in a study of both alcoholic and nonalcoholic incest offenders, Virkkunen (1974) discovered several differences between the two groups. The alcoholic group tended to be more violent, to have been sexually rejected by their spouses, and to have exhibited more aggression at home than the nonalcoholic group. He concludes that there is some evidence that the release of inhibitions attributed to alcohol is valid.

In general, most of the studies focusing on the relationship of alcohol use and alcohol problems and incidents of sexual abuse of children are quite dated. It would thus be especially problematic to generalize the findings to the problem as it exists today.

Spouse Abuse

As we have already stated there have been several studies which have attempted to determine the rate of alcohol involvement in cases of wife battery. In general, the rate of involvement appears to be less in general population surveys where alcohol is included with a multitude of other factors (Dobash and Dobash 1979; Gaquin 1977-78; Straus et al.

1979). On the other hand, evidence indicates the rate of alcohol involvement to be higher in studies that focus more directly on alcohol problems (Gerson 1978), and in smaller psychosocial clinical studies (Hilberman and Munson 1978; Morrison 1979). Methodological designs vary considerably and to date studies have not been replicated. In addition, no general population studies have been conducted which focus specifically on the alcohol component. Evidence is beginning to emerge, however, that alcohol does figure into the problem of spouse abuse. Questions of how, how much, when, and why remain largely unanswered.

Research in the area of marital violence has produced several interpretive frameworks to account for alcohol's involvement. Alcohol has been studied as a factor in such violence from a number of research perspectives including: individual psychopathological behavior (Faulk 1974; Halleck 1976), personality disorders in either victim or perpetrator (Shainess 1977; Snell et al. 1964), interpersonal family dynamics (Farrington 1975; Roy 1977), violent society or subculture (Steinmetz and Straus 1973, 1974; Straus 1973), or the overall sociohistorical structure of society (Dobash and Dobash 1979; Marsden 1978; Pagelow 1977). Each perspective ascribes a different importance or role for alcohol involvement and the number of studies in the area is growing rapidly contributing to the difficulty for any definitive analysis. To date the evidence remains inconclusive and contradictory.

In contrast to the studies on child abuse, a large number of studies do not exist which attempt to locate psychosis or pathology in the wife assaulter. The few studies that have looked into this area have yielded interesting results. In a study of 23 men who had violently abused their wives, Faulk (1974) found little evidence of psychiatric abnormality in more than one-third of his cases. He did find, however, several states of psychological disorder including depression, dementia, delusional jealousy, and anxiety. Elliot (1977) argued that evidence of the "dyscontrol syndrome"—the inability to control anger or rage—is an important factor to be considered. None of these studies examines the role of alcohol in conjunction with psychopathological behavior.

Studies that center on psychosocial disorders in either the victim or the perpetrator often include an alcohol component. Early studies on the problem of wife battery often centered on the psychological defects of wives, characterizing them as aggressive (or passive), masculine, frigid, or masochistic (Snell et al. 1964). Later reserch noted that the wife may often play a part in her own assault or feel some measure of guilt even though she may not be aware of it (Prescott and Letko 1977; Price and Armstrong 1978; Shainess 1977). Shainess also argues that often both partners share an equal psychological or emotional level, and that these problems are compounded when drug or alcohol abuse is present. Hanks and Rosenbaum (1977) studied women who lived with men who were both abusers and alcoholics. They suggest that women carry with them several past familial disorders which lead them to form adult problematic relationships. However, they concluded that alcohol plays only a secondary role in violent episodes.

Studies that focus on the batterer have identified several disorders which play some role in spouse abuse, including a typology of behavior patterns that include passive-aggressive, obsessive-compulsive, paranoid, and sadistic patterns (Shainess 1977). Gelles (1975) identifies sexual frustration and stress which may be compounded by the wife's pregnancy as determinants in wife battering situations. In a comparison of battered women and child abuse situations, Varma (1977) argues that life patterns of aggression and violence are often intergenerational in individuals. This has been supported by other studies which suggst that assaulters had often been abused as children (Flynn 1977; Roy 1977).

Alcohol's role in these studies of personality disorders has been noted by several researchers. In general, the evidence suggests that it plays a secondary role. Hilberman and Munson (1978) note that the violence is often rationalized by the wife who minimizes the husband's responsibility because of an alcohol problem. They further suggest, however, that alcohol use in combination with other character disorders is often a "lethal mix" which can lead to a violent situation. Shainess (1977) goes a bit further and points to alcohol as a disinhibitor in violence-prone men.

Several studies have provided evidence on the importance of intrafamily relationships. Stress and tension in the home seem to be mentioned often (Farrington 1975; Hilberman and Munson 1978; Roy 1977; Varma 1977), along with status inconsistencies between husband and wife (Carlson 1977), and the maintenance of male dominance in the family (Allen and Straus 1975). Another factor mentioned is the husband's low job satisfaction (Prescott and Letko 1977). Roy (1977) found the most prevalent contributing factor to be arguments over money.

Alcohol problems often figure into an analysis of interpersonal relations as a conditional factor. Thus, when alcohol was mentioned, it was often used as a parallel problem in the marriage, which could not be linked to the violence in a direct-cause relationship. Byles (1978) notes, for instance, that there is a high degree of association between violence and alcohol problems, and that violence is "more than twice as likely to occur in marital situations in which alcohol use is a problem, but the cause-effect question remains unanswered." Some researchers, however, in finding both problems of alcohol and violence in the family uncritically accept the cause-effect hypothesis (Langley and Levey 1977; Pizzey 1974; Roy 1977). Gelles (1972) and others argue, however, that quite the opposite might be occurring in these situations. They point to evidence of "deviance disavowal," a theory which indicates that often a husband will get drunk so that he may become violent, and later be able to blame the violence on intoxication. Further, Zacker and Bard (1977) note in a followup of an earlier study that assaultiveness is not related to alcohol in police-managed family disputes.

Gelles and others argue that alcohol plays a secondary role because the family itself represents a subsystem of violent interactions which are found in larger societal and cultural systems (Gelles 1972; Steinmetz and Straus 1974; Straus et al. 1979). Straus (1973) has argued, for instance, that conflict is a part of all human associations which increases with the level of intimacy. Thus, Steinmetz and Straus (1973) argue that some sort of violence will occur in almost all families. Gayford (1975b) argues further that it is difficult for women to find permanent sanctuary because of the likelihood of entering into a second, or even third, violent relationship which may represent a feature of a particular culture or subculture. Thus, according to Coleman and Straus (1979), although violence is likely to occur when the perpetrator is drunk, alcohol per se cannot be said to lead directly to wife battery. Further, they argue that it serves to provide the excuse for violence, supporting a "deviance disavowal" theory.

Other researchers state that the disinhibition-disavowal argument is a false one. One must look not at violence per se, but at the structural mechanisms which support it. The structural components most often mentioned are male dominance (Dobash and Dobash 1979), economic inequality (Marsden 1978), and a belief in a traditional cultural, political, and hierarchical structure (Pagelow 1977). Martin (1976) argues, for instance, that the problem lies within the institution of marriage itself and the way in which both women and men are socialized to act out submissive and dominant roles. Varma (1977) concurs in arguing that individual patterns of violence and aggression can be linked directly to the patriarchal character of the nuclear family which almost guarantees that violence will be directed at the less protected members of that family. Thus, many researchers in the area argue that this type of violence —against wives specifically—cannot be based in a general theory of violence or equated with other types of violence in the family (Chapman and Gates 1978; Dobash and Dobash 1979; Eisenberg and Mickelow 1977; Schuyler 1976)

It has been further argued, however, that male dominance itself is not enough to explain the structural forces that perpetuate wife abuse. It has been stated that the changing roles of women in the family and in the work force bear a strong relationship to wife battery (Marsden 1978; Roy 1977); also, that belief in the traditional order of things—in male dominance, in a conservative worldview—is prevalent in households where wife battery occurs (Pagelow 1977). According to these researchers, alcohol when used as a factor of analysis often tends to blur more extensive causal elements (Dobash and Dobash 1979; Klein 1979). Further, it has been contended that alcohol explanations are useful only insofar as they mask relations of dominance and patriarchy. Others argue that we should develop alternative methods of studying alcohol's relation to historical and structural manifestations of violence in the family through a determination of competing and interacting views of reality (Morgan 1979; Room 1979).

Still another perspective suggests that perceptions of a causal relationship between alcohol and marital violence exist simply because no objective evaluation of domestic violence has been made (Bard and Zacker 1974).

There remain several other specific areas of study into the problem of family violence. Steinmetz (1977), in an effort to establish the primacy of focusing on all aspects of family violence, suggests that there is a battered husband problem in many families. Both her methodology and her assumptions have been called into question, however, and the problem generally has been acknowledged as minimal by most of the researchers in the field (Dobash and Dobash 1979; Fleming 1979; Gaquin 1977-78; Gelles 1979; Klein 1979; Marsden 1978).

Of greater importance to studies of alcohol and family violence is an emerging awareness of elder persons abused by their children or even grandchildren (Marsden 1978; Straus et al. 1979). The estimates are that at least 500,000 to 1 million aged parents are abused each year (*Newsweek* 1980). The problem extends to neglect and verbal abuse as well. To date, research in the area has been sketchy and any possible links to alcohol abuse have not been explored.

Conclusion

There are several problems with studies that attempt to ascribe alcohol drinking to problems of marital violence. First, no research has yet established a sequence of events leading to battering situations. Second, there is no historical compilation of events which could interpret change over long-range battering situations. Third, if alcohol is said to be associated with the problem, no study has empirically established how and where drinking occurs, or if the drinking situation included one or both parties. Fourth, although mentioned in some studies, no research has yet determined the importance of other contributing causal factors. Fifth, little systematic attention has been given to the negotiation of interpretations in situations involving alcohol. Thus, the reasons why some people ascribe certain behavior to alcohol and others do not remains a mystery in most of the literature. And, finally, research on the problems of family violence that attempts to posit an association with alcohol, does so without any systematic attention to the alcohol literature on familial conflict, on effects, on aggression, or on crimes of violence.

It seems imperative that research in this area begin to establish some links among the many disciplines addressing this problem. Marsden (1978) suggests an alternative research agenda. He posits the need for an interdisciplinary approach. His statements are apropos to research linking alcohol to the problem. He writes:

> A shift away from individual pathology to viewing violence also in a more structural way implies at best some sort of fusion between psychiatry, psychology, and sociology, possibly with a number of other specialisms making a contribution. (p. 129)

It is also important to remember that much of the research in this area is fairly recent, especially studies specifically looking at alcohol links and studies of wife battery. An overwhelming number of studies have been published in the last 3 years alone. It seems that the path of future inquiry suggested here should take into account the need for future policy directives. Because policy in this area is so diverse, because no specialized policy has yet been established to provide services regarding alcohol-linked family violence, a heavy burden rests on the academic community to provide the foundation for relevant policy alternatives. This, in turn, places an increasing responsibility on Federal and State Governments to support such research endeavors.

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Chapter 7

Mechanisms of Genetic Influence on Alcohol-Related Behaviors

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Abstract

Studies of resemblance among family members, between twins, and between adoptees and their adoptive and biological parents have provided data that are persuasive concerning the existence of hereditary influence on alcohol behaviors. This evidence in no way denies the importance of environmental influences, which may range from molecular to sociocultural. The quantitative genetic perspective, by virtue of its concern with the proportions of variability in a population that are due to individual differences in genetic constitution and to individual differences in environmental circumstances, explicitly acknowledges both nature and nurture.

Genetic influence on some physiological characteristics related to alcohol consumption is difficult or impossible to study in human beings. Many powerful animal models exist for such research in the form of genetically defined rat and mouse populations. One such population type is the inbred strain. Animals within each inbred strain are genetically alike (with minor qualifications), and inbred strains differ genetically from each other. Thus, differences among two or more inbred strains with respect to a trait constitute prima facie evidence of genetic influence on that trait. Selective breeding provides more powerful models because they are specifically generated to differ in a certain trait, whereas genetic differences among inbred strains are largely a matter of chance. Systematically maintained genetically heterogeneous stocks are particularly valuable for correlational research.

Studies with rats and mice have demonstrated genetic influence on ethanol consumption, initial central nervous system sensitivity, ability to acquire tolerance, and expression of withdrawal symptoms. Knowledge about the mechanisms through which genes influence these attributes is growing at an accelerating rate. Evidence suggests that alcohol consumption, as well as some of the pharmacological actions of alcohol, may be influenced by hereditary differences in brain serotonin and catecholamine metabolism. Individual differences in alcohol consumption and in the effects of alcohol may also be related to variations in the activities of liver alcohol and aldehyde dehydrogenase.

Introduction

The evidence that heredity plays a role in determining individual differences in alcohol consumption, susceptibility to alcoholism, and other problems associated with the use of alcohol is now very substantial. Numerous studies of relatives of alcoholics (more recent examples include Amark 1951; Gregory 1960; Winokur and Clayton 1968; Winokur et al. 1970) have provided evidence that relatives, particularly male relatives, of alcoholics are at higher than average risk for developing alcoholism themselves. As is generally true of family studies, these findings are not definitive, because the heightened risk could be the result of shared environmental influences as well as of shared genes.

Studies with twins, such as those of Kaij (1960), Partanen et al. (1966), Loehlin (1972), and Pedersen (1980), have supported the hypothesis that at least some part of the familial resemblance in alcoholism or in parameters of alcohol use is due to shared genes. The basic logic of twin studies involves the comparison of the degree of similarity between members of identical (monozygotic, MZ) twin pairs, who are identical genetically, to the similarity between members of fraternal (dizygotic, DZ) twin pairs, who are no more alike genetically than ordinary siblings. Greater resemblance between identical twins than between fraternal twins is taken to mean that genetic factors are involved in determining individual differences in the trait under investigation, and quantitative comparisons of the resemblances for the two classes of twin pairs are made to estimate the relative contributions of genetic and environmental factors. Twin studies, like family studies, are less than definitive, largely because many analyses require the assumption that, on the average, the environments of identical twin pairs are not more similar than the environments of fraternal twin pairs. It is usually demonstrable that identical twins do have more similar environments. However, this does not weaken the analysis if the environmental factors for which they are more similar have no effect on the measured trait. Recent evidence from several behavioral genetic studies (e.g., Vandenberg and Wilson 1979) suggests that the method may be more robust than was long thought to be the case.

The strongest evidence for genetic influence on alcohol-related behaviors has come from adoption studies in which the effects of biological parentage and rearing parentage are disentangled. The first study of this kind, that of Roe (1954), actually obtained rather negative findings. Many methodological difficulties of that study have been identified, however, and the subsequent, methodologically sounder half-sibling study by Schuckit and his colleagues (1972) and adoption studies by Goodwin and co-workers (1973, 1974, 1975, 1977), by Bohman (1978), and by Cadoret and Gath (1978) have provided clear evidence that the biological relationship is more important in influencing the likelihood of alcohol problems than is the rearing relationship.

This research domain has been the topic of previous Special Reports to the Congress on Alcohol and Health. The relevant literature has been summarized in various review papers (Goodwin 1980; Omenn 1975) and will not be discussed further in this report. In general, the weight of evidence is very impressive—heredity does influence the consumption of alcohol and the effects of alcohol consumption on the individual. Much remains to be learned about the details of this generalized conclusion, of course. For example, the possibility of genetic heterogeneity, with different genetic factors involved in different subtypes of alcoholism or other alcohol-related problems, is a research area of great promise.

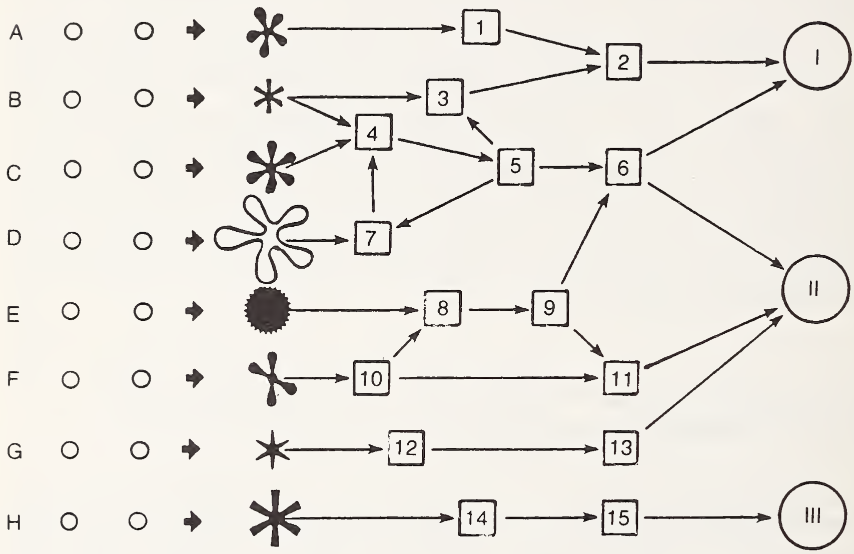
Of particular importance is the research effort to elucidate the molecular and physiological mechanisms through which the genes exert their influence. Such investigations play a central role in the search for differential etiologies, the identification of individuals at risk, and the development of rational preventive and therapeutic measures. At present, this research area is represented more by studies on animal models than by studies on human beings. Interest in the latter area is accelerating, however, and it is quite likely that significant advances will be made in the near future.

A Multiple-Factor Perspective on Genetic and Environmental Influences

It is sometimes difficult for behavioral and social scientists concerned with alcohol to reconcile the findings of hereditary influence with their own domains that emphasize social, cultural, and interpersonal factors in the etiology of alcoholism and other alcohol-related problems. To some extent this difficulty is an unfortunate legacy of the nature-nurture formulation that conceived of genetic factors and environmental influences as exclusive determinant systems in a contest-like situation where only one or the other could "win." This is a long-outmoded view, but it can still be an impediment to interpretation in disciplines some distance removed from the genetic sciences. It may therefore be useful to provide a brief synopsis of a current multiple-factor perspective.

Some essential features of this perspective are incorporated into the highly simplified schema shown in figure 1. On the left are displayed eight pairs of genes, identified as A through H. On the right are three different phenotypes (measured traits) identified as I, II, and III. A short arrow leading from each gene pair to an asterisk-like symbol representing an enzyme signifies that the basic action of genes is to confer specificity on enzymes. The enzymes catalyze chemical reactions in the body and thereby impinge on all of the organ systems and functions (identified by the numbered squares in figure 1). Various kinds of interactions may exist among these organ systems and functions, as shown. One effect of these interrelationships is that the action of a gene pair may "spread out" as we move from left to right in the diagram so that its influence affects more than one phenotype. Gene pair E, for example, has an influence on phenotype I through organ systems 8, 9, and 6, and also has an influence on phenotype II through the route 8, 9, and 11. This phenomenon of *pleiotropy* is the basis for the genetic contribution to correlations between and among phenotypes.

Figure 1. Highly Simplified Schema Illustrating Pathways of Genetic Influence on Three Hypothetical Phenotypes



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Tracing backward from a measured trait (phenotype II, for example), we can also see that many genes may influence a particular trait. The complications in outcome that can arise from such *polygenic* influence frustrate simple Mendelian expectations. The failure of the simple Mendelian pattern to appear in the distribution of affected family members does not, therefore, constitute evidence against a genetic hypothesis.

It has already been noted that genes work through enzymes and through the anatomy, physiology, and biochemistry of the body. There is no "genetic" influence acting *in vacuo*. Thus, while the specific details of the total causal pathway from gene to any particular phenotype may be lacking, the general nature of the genetic influences is known. There is no need to invoke any "mysterious" extracorporeal mechanisms of genetic effect.

Figure 2 is a repetition of figure 1, but with the addition of wavy arrows representing environmental influences. Acting through the same causal channels as those that convey genetic influence, these environmental effects also impinge on more than one trait; similarly, any particular trait may be seen to be influenced by more than one environmental agent. These well-known characteristics of environmental influences thus seen to be parallel to the genetic phenomena of pleiotropy and polygeny. It is also obvious that there are manifold opportunities for genetic and environmental factors to coact and interact. Under these circumstances, with multiple genetic and multiple environmental influences on a characteristic, the appropriate research questions concern the relative contribution of each domain of influence to the *variability* of the phenotype. Estimates of the relative contribution of genetic influences are often presented as "heritability," which reflects the proportion of the total variability ascribable to genetic differences among members of the population under investigation. An equally useful index would be "environmentality," or the percentage of the total variation ascribable to differences in the environmental circumstances of members of the investigated population. Each of these indexes is simply the quantity one minus the other.

A particularly attractive research strategy has been to study the mechanisms of gene action, or the pathways that lead from genes to alcohol-related behaviors. The biological "markers" that might be identified by such research appear to offer the promise of identifying individuals at risk and providing the knowledge base for the development of rational preventive and therapeutic measures. We shall consider separately the human research and the relatively more abundant animal research on these matters.

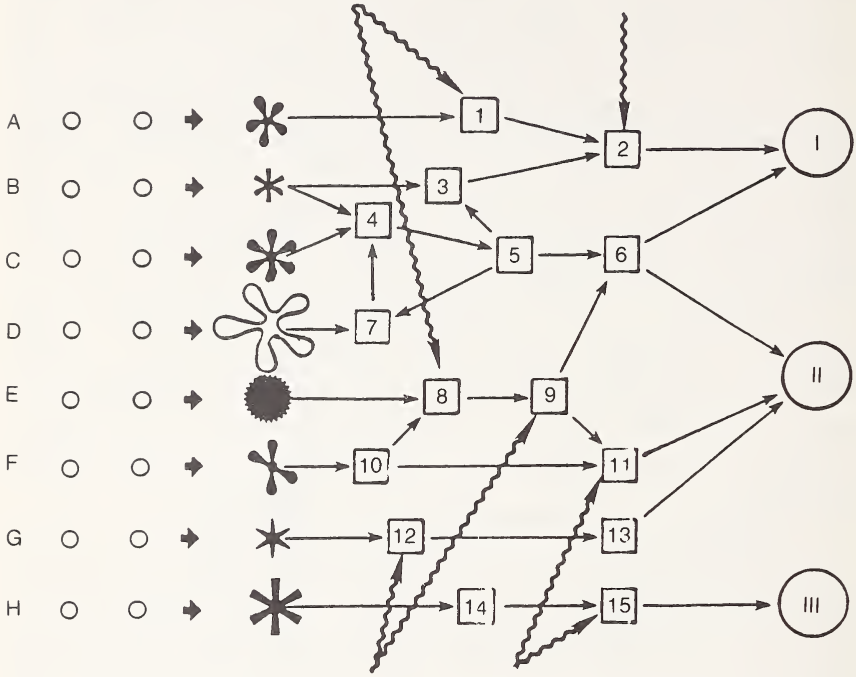
Genetic Influence on Biological Mechanisms in Alcohol-Related Behaviors: Research on Humans

The studies cited in this section have been concerned with the metabolism of alcohol. Consequently, it should be noted at this point that alcohol is metabolized to acetate primarily in the liver by means of a two-step process involving the enzymes alcohol dehydrogenase and aldehyde dehydrogenase. The first enzyme catalyzes the conversion of ethanol to acetaldehyde; the second converts acetaldehyde to acetate, which is degraded ultimately to carbon dioxide and water.

Twin Studies

Initial studies of genetic and environmental factors affecting ethanol metabolism in human beings were conducted by Vesell et al. (1971), who showed MZ twins to be more similar than DZ twins in rates of ethanol metabolism. The very close resemblance of MZ twins in these

Figure 2. Schema Illustrating Joint Influences of Genes and Environment



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studies was interpreted as showing a genetic influence on ethanol metabolism rate. Although some studies (e.g., Vesell 1968) have found that numerous drugs and environmental chemicals induce liver microsomal enzymes, and it is well known that these systems are related to the microsomal ethanol oxidizing system (MEOS) in the liver, the findings of Vesell et al. (1971) suggest that variation in the activity of liver alcohol dehydrogenase (ADH), a major enzyme involved in alcohol metabolism, is influenced greatly by genetic as well as environmental factors. In other recent studies, Kopun and Propping (1977) examined the influence of genetic and environmental factors on the kinetics of ethanol absorption and metabolism in twins following a single oral dose of alcohol. By comparing similarities of MZ twin pairs to those of DZ twin pairs, these investigators determined the heritability values for rates of absorption, degradation, and elimination of ethanol to be 0.57, 0.41, and 0.46. They also demonstrated that individual differences in patterns of daily alcohol intake and smoking (environmental factors) influence the pharmacokinetics of ethanol metabolism.

The studies of Vesell et al. (1971) and of Kopun and Propping (1977) produced results that help identify some mechanisms involved in individual differences in the rate of ethanol elimination. One of Kopun and Propping's most interesting observations was the significant heritability values for alcohol absorption. It is anticipated that this observation will lead other investigators to study the relevance of individual differences in alcohol absorption to alcoholism.

In other studies designed to determine the influence of genetic factors on ethanol's actions in the central nervous system (CNS), Propping (1977) measured the effects of ethanol on electroencephalograms (EEGs) obtained from MZ and DZ twins. In general, Propping noted that ethanol causes the number of beta waves to decrease, while the number of alpha and theta waves increases. The EEGs of MZ twins were found to react similarly to alcohol, whereas the EEGs of DZ twins became more dissimilar after alcohol administration. The author proposed that individual differences in the extent of alcohol's effect on the EEG might reflect differences in sensitivity of the ascending reticular activating system. It is clear that further research is needed to elucidate the mechanisms of alcohol's actions in the CNS and to identify the factors that cause individual differences. Results of studies to date have demonstrated genetic as well as environmental influences on these parameters, in accord with the general model of multiple factor influence (see "A Multiple-Factor Perspective on Genetic and Environmental Influences").

Ethnic Studies

Demographic data reported by a number of researchers indicate large differences in the incidence of alcoholism and alcohol misuse among peoples of different ethnic and racial origins. Although this phenomenon traditionally has been attributed to differences in sociocultural factors, the possibility that biological factors are involved is raised by recent research. For example, Wolff (1972, 1973) reported that alcohol-induced facial flushing was more frequent in Oriental than in Caucasian samples, and Ewing et al. (1974) have provided a basic replication of Wolff's results.

In a study that may relate to the pharmacological mechanisms responsible for the observed population differences in incidence of alcohol-induced flushing, Fenna et al. (1971) found that ethanol is metabolized significantly faster in Caucasians than in Eskimos or American Indians from the same region, and that neither previous experience with alcohol nor diet accounted for the observed differences. Bennion and Li (1976) also studied racial differences in ethanol metabolism rate and in liver ADH activity. The average metabolism rates of 30 American Indians and 30 Caucasians were virtually identical, and comparisons of liver ADH activities and isozyme patterns in biopsy specimens revealed no racial differences.

Contradictory results were obtained, however, when Farris and Jones (1978) compared the ethanol metabolism rates of 17 male American Indians and 17 male Caucasians. The American Indian group was found to metabolize alcohol significantly faster than the Caucasian group, and to reach significantly higher peak blood alcohol levels. An explanation for the discrepancy between the study by Bennion and Li and that by Farris and Jones could be that the former included both male and female subjects in each group and that differences in body weight were taken into consideration in the latter study but not in the former. Whatever the explanation, the mean differences between ethnic groups must be interpreted cautiously, occurring as they do in a context of large intragroup individual differences.

Reed et al. (1976) found that 15 Chinese and 12 Canadian Indians metabolized alcohol more rapidly than did 37 Europeans. Hanna (1978) partly confirmed this result in a study of the ethanol metabolism rates of 39, 47, and 68 subjects of Chinese, Japanese, and European ancestry, respectively. After correction for body weight, the data indicated that metabolism rates were significantly faster for the Chinese and Japanese groups than for the European group. The author noted that if variation in ADH activity does not account for ethnic variation in rate of ethanol metabolism, then anatomic variation may be an important factor. For example, differences in liver size could account for considerable variability in ethanol elimination rate. Reed (1978) recently reviewed five comparative studies of alcohol metabolism in various racial groups and concluded that variation in metabolism rate among the races is not different in kind from variation among individuals within a given racial group.

Racial differences in liver ADH activity have been noted, and it is possible that these differences may account for some of the variation in alcohol metabolism rate. For example, von Wartburg et al. (1965) isolated and characterized "atypical" hepatic ADH, and subsequent work has suggested that there may be several atypical ADHs. Studies like that of Murray and Price (1972), reporting differing frequencies of types A and B ADH in Americans of Caucasian and African ancestry, offer the prospect of relating racial differences in physiological responses to alcohol to frequencies of the genes influencing the molecular configuration of ADH.

It has recently been reported (Harada et al. 1979) that members of Mongoloid races who demonstrate a flushing response to administered doses of ethanol have an atypical aldehyde dehydrogenase (AlDH) which has a high Michaelis constant for acetaldehyde. It is well known that acetaldehyde induces peripheral vasodilation and can induce the flushing response. These findings suggest that the flushing response may be related to individual differences in AlDH rather than ADH activity, at least in ethnic groups of Mongoloid ancestry.

Although much of the research on ethnic differences in response to alcohol has been explicitly concerned with facial flushing, the relationship, if any, between the flushing response and alcohol abuse or alcoholism remains to be demonstrated. An important step in this direction has been taken by Sanders et al. (1980), who not only replicated the earlier observations of racial differences in sensitivity to alcohol, but also analyzed the correlation between degree of flushing and change in reported mood state. Briefly, individuals of two ethnic groups (either European or Japanese ancestry) exhibited a positive relationship between degree of flushing and psychological activation–decreased fatigue, and increased feelings of vigor or activity. There remains a large gulf between mood change in response to alcohol and alcoholism, but this study does point the way to a potentially very valuable area of research.

Family Studies

Several family studies have been conducted to assess the risk of alcoholism in relatives of alcoholics, but little use has been made of familial relationships in the study of biological mechanisms. The results of one recent study, however, have explicitly linked a biochemical parameter to alcoholism. Schuckit and Rayses (1979) compared acetaldehyde levels in blood samples from 20 healthy young men with alcoholic parents to those in samples from matched controls with no family history of alcoholism. After a single oral dose of ethanol, the former group had acetaldehyde levels that were 30 percent higher than those of the latter group. These results must be viewed with caution, however, because the blood samples were frozen prior to acetaldehyde determination and this procedure has been reported to alter estimates of human blood acetaldehyde.

Genetic Influence on Biological Mechanisms in Alcohol-Related Behaviors: Animal Models

The Issue of Relevance of Animal Research to Human Alcoholism

Reservations have been voiced concerning the appropriateness of using animal models in the pursuit of knowledge about alcoholism. It is sometimes contended, for example, that alcoholism, defined often in terms of social and interpersonal consequences of the use of alcohol, is a uniquely human condition, and that no useful outcome can be expected of the animal research that has been and is being conducted. On the other hand, it can be argued that it is most unlikely that the behavioral and social consequences of the use of alcohol by a human being are totally uninfluenced by, or totally independent from, the anatomy, physiology, biochemistry, and pharmacology of the person. Insofar as animal models of the basic processes are informative about the cognate processes in humankind, the information obtained should ultimately aid in illuminating the human condition of alcoholism itself.

Other criticisms have been directed at the narrow focus of the animal models that have been employed. These criticisms call for a model that is identical to the human condition. Such a requirement seems to demand a better understanding of human alcoholism than is presently available. Furthermore, if we were in possession of sufficient information to judge the total compliance of any given model, the model would no longer be required. Undoubtedly, greater attention could and should be paid by the animal model researchers to the subtleties and complexities of the human condition, but it appears likely that evidence on almost any aspect of the pharmacodynamics of alcohol will be useful, either in illuminating part of the total human picture or in suggesting hypotheses for further work that in turn will illuminate the human situation.

The researcher who uses animals to study the genetics of alcohol-related phenomena has methods that are unavailable to the researcher who studies human subjects directly. These methods offer genetic "tools" that in many ways provide more definitive results than can be obtained from human research. These tools have their limitations, however, and an appreciation of the research literature on mechanisms through which genes influence alcohol-related phenomena requires an understanding of these limitations. The principal tools are inbred strains, selectively bred lines, and genetically heterogeneous stocks.

Animal Models as Genetic "Tools"

Inbred Strains. Inbred strains are developed by mating successive generations of close relatives. In laboratory mice and rats, the degree of inbreeding is usually sib mating, so that each generation goes through a two-parent bottleneck and those parents are siblings. After this process has been repeated for 20 consecutive generations, the animals within an inbred strain have approached the condition of genetic uniformity. An essential point is that inbreeding is not *for* any particular phenotype; it is simply inbreeding. Because the particular genetic constitution that is fixated by the inbreeding process is largely a matter of chance, the screening of a number of inbred strains for any characteristic, alcohol related or otherwise, is likely to reveal strain differences. If these observations are made under well-standardized environmental conditions, in view of the fact that strains from different origins have dismissably small likelihoods of being genetically identical, we may regard strain differences as prima facie evidence of a genetic influence on the trait under investigation. As will be apparent later, differences among inbred strains, particularly inbred mouse strains, have been discovered for a large variety of alcohol-related phenotypes.

The strong advantage of inbred strains is their stability, offering research material of relatively unvarying quality in different places and at different times. Thus, a series of investigations can have a common referent. Inbred strains are not particularly useful, however, for the study of associated traits. For example, if two strains known to differ in alcohol preference are compared for their ability to acquire tolerance to alcohol with the intention of testing a hypothesis that tolerance and preference are related, the results can be misleading. Because inbreeding has generated uniformity of the entire genetic constitution of each inbred strain, we can expect strains to differ with respect to myriad phenotypes. Thus, an apparent association between any two phenotypes could be entirely fortuitous.

Selectively Bred Lines. Selective breeding, in contrast to inbreeding, is directional. That is, beginning with a *genetically heterogeneous* population, steps are taken to alter the genetic constitution of a derived line in a particular direction. This is accomplished by mating individuals that exhibit the most extreme levels of the desired phenotype. If their extreme manifestation of the phenotype is in part due to genetic influences, then their offspring should possess more of the genes responsible for that extreme manifestation, on the average, than do individuals in the total population from which their parents were selected. This procedure can be repeated in succeeding generations to yield a systematically increasing level of the phenotype in that selected line. Typically, in laboratory applications, selective breeding is undertaken in both high and low directions, and unselected control groups are often also included in the experimental design. Even when the heritability of the phenotype is relatively low, persistent selective breeding can generate lines of animals that exhibit essentially no overlap in level of the selected phenotype. These animals provide useful tools for investigations into mechanisms, because if inbreeding has been successfully avoided only those genes pertinent to the selected phenotype should differ on average between the two lines. Thus we expect fewer or no spurious and fortuitous relationships, and the discovery of associations can be more strongly interpreted.

Genetically Heterogeneous Stocks. Systematically maintained genetically heterogeneous stocks offer populations of choice for many normative purposes and for studies of correlations between and among a number of characteristics. An appreciation of the advantages of such stocks is only recently developing. While no individual will ever be repeated genetically in such stocks, the principal population genetic parameters based on frequencies of the different genes can be very stable over generations. By virtue of the systematic deployment of variability in these stocks, the range of individuality necessary for effective correlational studies is ensured. Unfortunately, such heterogeneous stocks cannot be produced simply by the avoidance of systematic inbreeding. Many commonly employed "heterogeneous" groups of laboratory animals are better described as "haphazard," and do not offer the benefits of the more systematically maintained stocks.

Review of the Literature

Strain and Line Differences in Alcohol Consumption. Many studies of human beings and laboratory animals have revealed individual differences in the effects of alcohol and in voluntary alcohol consumption. Evidence is convincing that these individual differences in response to alcohol are influenced to some extent by heredity, and it also is apparent that genetic as well as environmental factors are involved in alcoholism. Genetic studies on the actions of alcohol in animals can be divided arbitrarily into two major categories: (1) those that examine how extensively the effects of alcohol and alcohol consumption are genetically influenced, and (2) those that use genetic variability to study the relationships among the actions of alcohol and associated traits. In this context genetic variability can be viewed as a valuable aid in explaining mechanisms of alcohol's actions.

Genetic influence on ethanol consumption by laboratory mice and rats is well documented. For example, it is well known that mice of the inbred C57BL strain, when offered a choice, strongly prefer an ethanol solution to water, whereas DBA mice have a low preference (McClearn and Rodgers 1959; Rodgers and McClearn 1962). Ethanol preference is also responsive to selective breeding. Eriksson (1968, 1969*b*, 1971*b*) and, more recently, Li and Lumeng (1977) have established selected lines of rats that differ markedly in ethanol consumption. Eriksson's selected lines are designated as "alcohol acceptance" (AA) and "alcohol nonacceptance" (ANA), and the lines developed by Li are referred to as "alcohol preferring" (P) and "alcohol nonpreferring" (NP). Using a different measurement method, in which thirsty animals are offered only an ethanol solution, Anderson and McClearn (in press) selectively bred "high ethanol acceptance" (HEA) and "low ethanol acceptance" (LEA) lines of mice. The success of these selection programs provides firm evidence of a genetic influence on alcohol consumption.

Results obtained from classical Mendelian crosses of inbred mouse strains have shown that voluntary ethanol consumption is a polygenic trait with heritability estimates ranging from 0.14 to greater than 0.4 (Brewster 1968; Eriksson 1969; McClearn 1972). From selective breeding results, Anderson and McClearn (in press) calculated a realized heritability of 0.2 for ethanol acceptance. Whitney et al. (1970) reported similar heritability estimates based on parent-offspring regressions in a genetically heterogeneous stock of mice. There is no doubt that alcohol consumption is under some environmental influence, as indicated by heritability estimates less than 1. However, the elegant cross-fostering studies by Randall and Lester (1975*a, b*) have demonstrated that prenatal environmental influences do not eliminate the difference in ethanol preference between the C57BL and DBA strains, even though such influences can alter the mean preference levels of the two strains.

Strain and Line Differences in Initial CNS Sensitivity to Alcohol. Evidence for genetic influence on initial CNS sensitivity to ethanol has been provided by a variety of strain and line comparisons. The most frequently used measures of sensitivity have been motor activity after ethanol treatment and loss of the righting response ("sleep time") following administration of a hypnotic dose of ethanol. Kakihana et al. (1966) and Randall et al. (1975) found that inbred strains differed in blood and brain alcohol levels at the times of losing and regaining the righting response. For example, mouse strains BALB and DBA are more sensitive to the hypnotic effect of ethanol than the C57BL strain. Inbred strain comparisons of the effects of ethanol on various activity measures have included open-field, stabilimeter, and tilting-plane indexes. It is now well recognized that subhypnotic doses of ethanol ranging from 0.5 to 1.5 grams ethanol per kilogram of body weight cause an increase in open-field and stabilimeter activities in BALB mice, but have no significant effect on these activities in mice of the C57BL strain. When McClearn and Shern (1975) compared the effects of subhypnotic ethanol doses on open-field locomotor activities of various inbred strains, they found that the order of activation was BALB > C3H > A > DBA > C57BL.

Further evidence documenting genetic influence on CNS sensitivity to ethanol is provided by the studies of Riley and co-workers (1976, 1977), who have established selectively bred rat lines that differ in open-field locomotor activity after ethanol administration. The two lines are designated as "most affected" (MA) and "least affected" (LA). Rusi et al. (1977) have shown that the selectively bred AA and ANA rats differ *slightly* in CNS sensitivity to ethanol, with the ANA line being more sensitive than the AA. Over the past few years, several studies have utilized the "long-sleep" (LS) and "short-sleep" (SS) selected mouse lines derived from a genetically heterogeneous foundation population by McClearn and Kakihana (1973). These lines, currently in the 21st generation of selection, have diverged to the extent that there is virtually no overlap in the sleep times of the two lines. As will be discussed later, these lines differ some twofold in blood and brain alcohol levels at time of regaining the righting response following a hypnotic dose of ethanol (Erwin et al. 1976; Heston et al. 1974).

Evaluation of the rate of divergence of the LS and SS lines yielded a heritability estimate of approximately 0.18 (McClearn and Kakihana 1973). This moderate heritability index implies substantial environmental influences.

Strain and Line Differences in Acquisition of Alcohol Tolerance and Dependence. Inbred strains of mice differ in the acquisition of functional tolerance to ethanol, as defined by changes in "sleep time" and in blood alcohol level at time of regaining the righting response after several days of chronic ethanol administration. In studies by Grieve et al. (1979), C57BL mice developed a greater tolerance than did DBA mice. In somewhat similar studies utilizing the LS and SS lines, Tabakoff et al. (1980) found that SS mice acquired functional tolerance (as measured by both sleep time and blood alcohol at regaining of the righting response) more rapidly than did LS animals. It is interesting that the selected animals (SS) with greater genetically based initial tolerance (i.e., less sensitivity to ethanol) acquired tolerance more rapidly.

In studies of the acquisition of dependence as defined by the display of withdrawal seizures upon handling after 3 days of chronic exposure to ethanol, Goldstein and Kakihana (1974, 1975) observed that greater dependence was acquired by DBA than by C57BL mice. Goldstein (1973) also has been successful in breeding selected mouse lines that differ in the extent of acquired dependence as measured by severity of withdrawal.

In summary, studies using inbred strains and selected lines have demonstrated a genetic influence on acquisition of alcohol tolerance and dependence.

Strain and Line Differences in Ethanol and Acetaldehyde Metabolism. Genetic influence on ethanol and acetaldehyde metabolism and on liver ADH and AlDH activities has been indicated by the results of several investigations. Rodgers et al. (1963) and Sheppard et al. (1970) found C57BL mice had higher liver ADH activity and more rapid ethanol elimination rates than other inbred strains such as BALB, CBA, and DBA. It should also be noted that rats of the selectively bred alcohol acceptance (AA) line have been reported to have more rapid ethanol elimination rates and higher liver ADH levels than rats selected for nonacceptance of alcohol (ANA). Eriksson and Pikkarainen (1970), Belknap et al. (1973), and Sheppard et al. (1970) have shown that C57BL mice have higher liver AlDH activity than do DBA and BALB mice. Although genetic analyses have not yet been reported, data obtained to date indicate clearly that individual differences in ethanol elimination rates and hepatic enzyme activities are to some extent under genetic control.

Parameters Associated with Strain and Line Differences in Alcohol Consumption, CNS Sensitivity, and Acquisition of Tolerance and Dependence

A variety of biochemical measures, including ethanol and acetaldehyde metabolism and liver ADH and A1DH activities, have been examined for possible association with alcohol consumption. There have also been several investigations of assocations between ethanol preference and various neurochemical parameters—including serotonin (5-hydroxytryptamine) levels and metabolism, and catecholamine levels and metabolism.

Ethanol and Acetaldehyde Metabolism. Several studies have attempted to relate variability in rodent alcohol-consumption behavior to differences in rate of alcohol metabolism (Anderson et al. 1979). Many of these studies have focused on liver ADH and A1DH activities. Activities of these enzymes have been shown to differ among inbred mouse strains that differ in their preference for alcohol. However, as noted earlier, fortuitous associations between traits may be obtained when inbred strains are compared, and putative associations should be confirmed by correlational studies using genetically heterogeneous populations. Utilizing the genetically heterogeneous HS mice, for example, McClearn (1968) found that 10 percent of the variance in ethanol preference was related to differences in level of ADH activity. More recently, Anderson et al. (1979) have studied the correlations among liver ADH and A1DH activities and ethanol consumption in the F2 generation derived from C57BL and C3H parental strains. These investigators found a significant correlation of .25 between liver ADH activity and ethanol acceptance. In their selective breeding program for ethanol acceptance, Anderson et al. (1979) observed that liver ADH activity was 24 percent higher in the "high ethanol acceptance" (HEA) line than in the "low ethanol acceptance" (LEA) line, but found no difference in liver cytosolic A1DH activity.

Other data suggest that acetaldehyde oxidation by hepatic aldehyde dehydrogenase is importantly involved in determining alcohol preference. This argument is supported by studies of inbred mouse strains that differ in preference and by investigations using AA and ANA rats. Schlesinger, Bennett, Hebert, and McClearn (1966) and Schlesinger, Kakihana, and Bennett (1966) noted that C57BL mice have less circulating acetaldehyde after ethanol consumption than DBA animals do. This is consistent with the finding of greater hepatic AIDH activity in the C57BL strain (Sheppard et al. 1970). Similarly, Koivula et al. (1975) reported that the AA rats have significantly greater mitochondrial and microsomal AIDH activities than the ANA animals. However, there was no difference between lines in cytosolic (i.e., in the fluid portion of the cytoplasm) activities of this enzyme. Further support for the role of acetaldehyde in alcohol preference is provided by the observation that female C57BL mice consume more ethanol than males do and have lower acetaldehyde levels after ethanol injection (Collins et al. 1975). Although a complete genetic analysis has not been performed to examine the relationship between acetaldehyde and alcohol preference, recent studies by C. J. P. Eriksson (1980) support the hypothesized association between the measures.

Serotonin (5-Hydroxytryptamine) Levels and Metabolism. Reported data are consistent with the hypothesis that serotonin may be involved in individual differences in voluntary alcohol consumption, but the relationship is still obscure. Several investigators have observed strain differences in the effects of serotonin depletion on alcohol preference in rats. For example, Melchior and Myers (1976) found that p-chlorophenylalanine decreased preference in Long-Evans rats but had no effect on rats of the Royal Victoria or Wistar strains. These authors also reported a significant increase in ethanol consumption by Sprague-Dawley rats following the lesioning of central serotonergic neurons by intraventricular administration of 5,6-dihydroxytryptamine. Genetic influence is suggested by the fact that the same treatment decreased ethanol consumption by Long-Evans rats. In similar studies, this lesioning agent increased the ethanol consumption of Holtzman rats, but did not affect rats of the Wistar strain.

Further studies utilizing animal models as genetic tools to study the possible role of serotonin in preference were conducted by Ahtee and

Eriksson (1972, 1973). These investigators observed that both brain serotonin and 5-hydroxyindoleacetic acid, the acid metabolite of serotonin, were 15-20 percent higher in AA than in ANA rats. Chronic ethanol administrations for 1 month resulted in an increase in brain serotonin content in AA rats, but had no effect on this measure in ANA animals. Pickett and Collins (1975) found that ethanol preference and brain serotonin content segregated independently in an F2 generation derived from C57BL and DBA strains. The result suggests that there is no obligate relationship between brain serotonin level and ethanol preference.

Catecholamine Levels and Metabolism. Results of recent studies suggest that norepinephrine plays a role in voluntary alcohol consumption. Kiianmaa (1975) measured the effect on preference of lowering brain norepinephrine levels by several different means. For example, stereotaxic injections of 6-hydroxydopamine, which caused degeneration of the coerulocortical noradrenergic pathways, produced an increase in ethanol preference during the 5 to 6 weeks after treatment. While this effect on consumption appeared to be transient, Amit et al. (1976) have provided further evidence that disruption of catecholamine synthesis may be involved in alcohol preference. These authors observed that calcium carbamide, FLA-63, and disulfiram (inhibitors of dopamine beta-hydroxylase and aldehyde dehydrogenase) suppressed ethanol preference, and that the suppression appeared to be at least partly correlated with the ability of these agents to inhibit catecholamine synthesis.

Inbred mouse strains and selected rat lines have been used in attempts to test the hypothesis that catecholamines influence ethanol consumption. For example, Ahtee and Eriksson (1975) detected a slightly greater brain concentration of dopamine in AA than in ANA rats. However, no attempts have been made to find out whether ethanol consumption and brain catecholamine contents segregate together in the F2 generation produced by crossing the AA and ANA lines.

Collins et al. (1976) measured whole brain norepinephrine and dopamine in the LS and SS selected mouse lines and also determined the effects of hypnotic doses of ethanol on turnover rates of these neurotransmitters. Control levels of both norepinephrine and dopamine were significantly greater in the SS line. Perhaps of greater importance, ethanol reduced dopamine turnover in both lines, with the LS line exhibiting a greater effect. Dudek (1977), in a preliminary report, added further support to the notion that dopamine release is involved in ethanol's actions by showing that γ-butyrylacetone, which inhibits impulse transmission in dopaminergic neurons produced a longer loss of righting response in LS than in SS mice.

Taken together, these data suggest a role for dopamine and the dopaminergic system in the depressant effects of ethanol. In a recent series of elegant experiments, Dibner et al. (1980) demonstrated that beta-adrenergic receptor density is lower in the cortex of the alcohol-sensitive LS mice as compared to either SS animals or genetically heterogeneous (HS) controls. The densities of beta1 and beta2 adrenergic receptors were lower by approximately the same amount. The results were tissue specific in that there was no difference in the density of the beta-adrenergic receptors in the cerebellum. In these studies, Dibner and coworkers demonstrated that the affinities of the various dopaminergic and adrenergic receptors for the various ligands were the same in LS, SS, and HS mice. These studies support the conclusion that the dopaminergic system is involved in initial CNS sensitivity to ethanol. It will be of interest, as further genetic analyses are conducted, to determine whether differences in beta-adrenergic receptors segregate with brain sensitivity to ethanol in an F2 generation derived from LS and SS lines.

Investigations Using Genetically Heterogeneous Stocks

As we have noted repeatedly in this report, one is limited in the inferences that can be drawn from associations found between biological parameters and alcohol-related behaviors in studies of inbred strains. The use of genetically heterogeneous stocks is recommended for such correlational studies, and some of the investigations that have used heterogeneous stocks to evaluate associations have been cited in the previous sections. Few estimations have been made of the relationships between various biochemical measures and the actions of alcohol or voluntary alcohol consumption.

Even less is known about the correlations among the various actions of alcohol and alcohol-related behaviors. For example, the relationships among alcohol preference, central nervous system sensitivity, acquisition of tolerance to and dependence on alcohol, and ethanol metabolism have not been investigated. Since these four domains are probably inextricable components of the more complex condition of alcoholism in man, it appears imperative that studies be conducted to examine more carefully the relationships among them. Evidence presented in this paper illustrates that each of these alcohol-related phenotypes is under the influence of multiple genetic factors. It would not be surprising, therefore, if some genetic factors that influence one alcohol-related trait also influence other traits. With the accumulation of evidence of individual differences such as those cited above for a variety of alcohol-related responses, it has become increasingly clear that genetic influence is pervasive.

Prospects and Recommendations

This review of the literature has sampled only some of the anatomical, biochemical, and pharmacological correlates of alcohol consumption. Nevertheless, the data reveal genetic influence so ubiquitous as to make plausible the working hypothesis that *all* biological parameters related to alcohol use are subject to hereditary influence. This perspective has important implications for human alcohol use and alcoholism. If we may regard each pharmacodynamic parameter pertinent to alcohol consumption as subject to genetic variation, then we obtain a picture of enormous complexity. Each individual's use of alcohol will be guided by a unique blend of characteristics such as avidity, initial tolerance, ability to acquire tolerance, nervous system sensitivity, and liability to dependence. Various combinations of these attributes may lead to the behavioral pattern or patterns that we refer to as alcoholism.

Thus there may be many different ways to become an alcoholic. This is not a novel conclusion; the heterogeneity of "alcoholisms" has long been suggested. The present perspective simply suggests that a basic substructure for the diversity may be a genetic influence on biological parameters like those previously discussed. On this substructure there will surely be constructed further diversity from the complex experiential variables that act on humans. For example, peer pressure, economic disadvantage, religious instruction, parental example, and interpersonal relationships are environmental variables that may encourage or discourage alcohol use. The present perspective does offer some hope that studies of differential etiology might reasonably be expected to find useful biological "markers" as well as behavioral ones.

Furthermore, the working hypothesis of widespread genetic influence opens wide vistas for the development of new animal models. For example, we may be reasonably confident of the successful outcome of a selective breeding program for almost any alcohol-related phenotype we choose. We should be able to generate lines differing in ability to acquire tolerance; in liability to dependence; in activity of the MEOS system; and in rates of alcohol uptake, distribution, and metabolism. If it is deemed sufficiently important, we can attempt to put together various combinations: dependence-prone animals with and without high levels of MEOS activity, for example. We can also attempt genetic dissection of complex combinations of alcohol-related phenotypes. For example, the consequences of high ADH activity combined with high as compared to low AIDH activity could be investigated by selective breeding for the various combinations. Similarly, the question of whether a mouse or rat can be a high alcohol-consuming animal with low ADH activity could be explored by a selective back-crossing program that would bring those genes of C57BL animals that influence high preference together with those of DBA animals that influence low ADH activity. Other methodologies also offer promise. As yet little exploited in alcohol research, the study of recombinant inbred strains (strains newly inbred from the genetically heterogeneous population produced by cross-breeding hybrids between the two parental inbred strains) offers the possibility of identifying single major genes that influence specified alcohol-related processes. In summary, we can use existing and proven genetic techniques to generate animal models of greater complexity or of greater specificity, as needed for differing research purposes.

It must be emphasized, however, that the phenotypes must be chosen with care. Selection programs, for example, are so time consuming, laborious, and relatively expensive that they represent a long-term commitment of a laboratory's facilities and staff. Many of the criteria for appropriateness of a phenotype for study will come from animal research, naturally. However, it seems important that the choice of alcohol-related characteristics to be explored by the development of new animal models be informed by the hypotheses and empirical data of those who conduct research on human alcohol use and alcoholism or whose clinical practice is devoted to alcohol-using humans. There are perhaps fewer barriers to information exchange between the "human" and the "animal" researchers in the case of alcohol than in many other areas of inquiry. Nevertheless, diffusion of ideas is sometimes slower than might be desired. Systematic efforts to improve communication might well result in the development of more useful models by the animal researchers and more rapid application of animal-generated hypotheses by the human researchers, to the advantage of all.

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Chapter 8

Precursors and Developmental Influences on Drinking and Alcoholism: Etiology from a Longitudinal Perspective

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Abstract

A model is presented that is designed to highlight linkages among types of drinking influences. It is concerned with the acquisition and maintenance of both normal and abnormal patterns of drinking behavior. It deals with the acquisition process as it occurs developmentally (over time) and across levels of influence. Four classes of influence are discussed: sociocultural and community influences, primary group (family) influences, intimate secondary group (peer and spouse) influences, and intraindividual influences. Using this framework, the substantive etiological data on the development of drinking and alcoholism is then critically reviewed.

The review indicates that (1) longitudinal studies of problem drinkers, as children, show a lack of family cohesiveness, inconsistent parenting, and parental deviance in their histories, (2) longitudinal research tentatively suggests that peer influences become increasingly more significant as the individual grows older, while parent modeling effects remain constant or drop out entirely as the child matures into adulthood, (3) early attitudes about alcohol use and abuse appear to be determined as much by cognitive/developmental factors as they are by the content of alcohol-related information in the environment, (4) changes in drinking behavior to greater levels of consumption have been observed in transition periods of an individual's life, e.g., high school to college, college to work, and these shifts in drinking are often accompanied by changes in choice of friends, church attendance, and interests, but the etiologic significance of transitions as causative agents in abusive drinking still needs to be firmly established, and (5) existing research still leaves unanswered the critical questions of the extent to which alcohol problems may be anticipated prior to the drinking years (i.e., in early or middle childhood) and of the extent to which there is continuity in problem drinking over long spans of developmental time.

Specific research needs and methods to answer these questions are proposed.

Introduction

It has been known for a long time that alcoholism runs in families (Cotton 1979; Jellinek 1945, reprinted in 1972) but the specific details of why this should be true still remain unknown. One popular view is that the later-to-be drinking habits of the child are explainable by learning and imitation. Growing up in a family where alcohol is readily available, and is used by parents as a recourse for insolvable conflict and unhappiness, makes later drinking a more readily available alternative for the child-as-adult. The converse may also occur: Drinking is seen as a feared and avoided solution for those who have experienced the scars that growing up in an alcoholic family can bring. In this latter case an abstaining position about alcohol use would occur.

An equally compelling popular view observes that not all children from alcoholic families grow up to be alcoholic themselves, or abstainers for that matter. This position takes note of the profound consequences of alcoholic disorder that encompass addictive drinking and other self-destructive behaviors and life-damaging sequelae of great severity; it is hard for the layperson to imagine such behavior as having been simply learned. Cited also are the retrospective reports of alcoholics, documenting the special and sometimes overpowering connection that alcohol, as a drug, occupied in their lives from early on in the drinking experience, and sometimes even from the first drinking occasion. The extreme of this view is that alcoholism is a biologically based disorder of undetermined mechanism that may very well be genetic in origin.

The scientific evidence of the recent past lends credence to both of these views, but with some important modifications: There is a significant body of knowledge documenting that environmental influences do in fact shape the acquisition and maintenance of the consumption of beverage alcohol for normal drinkers, alcohol abusers, and alcoholic individuals at a variety of levels of influence. From cross-cultural studies of primitive societies (Bacon et al. 1965), from the study of variations in patterns of alcohol use in modern cultures (Bales 1962; Bunce and Room 1977; Sadoun et al. 1965), as well as from studies of ethnic and sociocultural variations in alcohol use and abuse in our own culture (Cahalan et al. 1969; Cahalan and Room 1974; U.S. Department of Health, Education, and Welfare 1978), it is well documented that cultural tolerance-intolerance of alcohol use and social position (by way of age, sex, education, and socioeconomic status) are not only significant indicators of variations in alcohol use and alcohol problems, but also are directly implicated in the etiological process of learning to drink and later consuming alcohol with varying degrees of problems. At a level closer to the individual, significant sources of etiological variation have also been traced to the family (Ablon 1976; Jacob et al. 1978; Wolin et al. 1979) and to specific influences of parents (Wilson and Orford 1978; Zucker 1976).

At the other end of the spectrum, significant evidence from twin studies (Kaij 1960; Partanen et al. 1966), and from adoption studies of half siblings (Schuckit et al. 1972), and offspring of alcoholic parents (Goodwin et al. 1973, 1974) implicates genetic contributions as significant, biologically mediated etiological predisposing factors, more clearly for later alcoholism, but possibly also for variations in the range of more normal consumption patterns. Even without the presumption of genetic mediation, a substantial amount of evidence exists that implicates biochemical mechanisms in alcoholism both as a chronic disorder (Mendelson 1971) and possibly at the predispositional level (Kissin 1979).

The scientific question, however, in contrast to the lay view of exclusive nature *or* nurture influences, is framed quite differently. Genetic variation always unfolds in and is acted upon in a specific environmental context. The crucial etiological question facing researchers is the relative influence of one set of factors compared to the other, how they interact, and the role of each at different stages in the development of the problem.

Full understanding of the causes of alcoholism, as well as of the acquisition and maintenance of other, less abusive forms of drinking, requires that investigators be able to trace out just what the critical etiological dimensions are, and specify the developmental time periods when they are operative. It is within this framework that attention to predrinking influences upon drinking (and alcoholism) assumes special importance. When this job is adequately done, it has the potential for suggesting intervention strategies that are only dimly hinted at when our major understanding of alcoholic disorder is based on mechanisms having to do with the chronic forms of the disease process. Such understanding also implies that we may more effectively prevent the process before it fully manifests itself.

Attention to these issues has been largely piecemeal until the last decade, for a number of reasons:

1. Historically, the exigencies of the treatment situation required a response to the immediacy of alcoholic distress. The questions most likely to confront investigators working with these chronically ill individuals are more often and quite naturally related to phenomena they see clinically: the nature of withdrawal, biochemical differences related to tolerance, and the search for biochemical markers that distinguish alcoholics from more moderate drinkers. When one considers the profound nature of alcoholic distress, the frequent degenerative physical sequelae, and the difficulties involved in bringing about long-term and enduring change both in patterns of drinking and in dealing with the frequent self-recrimination and depression so often associ-

ated with this disorder, it is not surprising that behavioral aspects of the disorder were comparatively neglected. Nor is it surprising that etiological questions—with their seemingly abstract promise of potential help in understanding the nature of the disorder—took a back seat.

2. At another but related level, definitional task forces concerned with the establishment of criteria for alcoholism (American Psychiatric Association 1980; National Council on Alcoholism 1972) have historically encouraged greater focus on biological characteristics of the disorder, on the presumptive addictive qualities (and mechanisms) accounting for both the compulsive drinking and its sequelae, and on the *presumed continuity of process*, starting with early drinking and unfolding gradually but steadily over time (Nathan 1980). Such emphasis is understandable from the perspective that those responsible for diagnosis (i.e., medical practitioners and staff at inpatient facilities) typically see those whose disorder shows all the signs of having in fact been continuous. Research in other areas, and particularly those where a longitudinal data base has been established, points up the significant biases about the nature of pathogenesis that can accumulate when the view of disease is based solely on treated cases, and the predominant method of establishing etiology is based on retrospective report and is lacking in systematic followup (Bleuler 1979; Cahalan 1970; Garmezy and Streitman 1974; Roizen et al. 1978).
3. Last, the approach to early drinking that has viewed alcohol use among youth as the use by a ''special population,'' with specific characteristics and problems of its own related to learning to drink and problem use in adolescence, but not thereafter (Bacon 1976; Marden et al. 1976; Rachal et al. 1976), has its own presumptions that involve a *discontinuity* view of the relationship of early drinking to adult drinking and drinking problems. Current evidence suggests that in some instances this view is incorrect, in others correct.

This chapter reviews the evidence concerning the causes of drinking and alcoholism from a developmental perspective, including coverage of predrinking influences on later drinking behavior. Such a perspective implies that precursors to drinking in fact are etiologic (i.e., causative) to later alcohol use or abuse. While this hypothesis remains at the moment a highly plausible one for some types of alcoholic phenomena, as we shall see, it is still to be firmly established. In considering it thoroughly, special attention needs to be given to (1) the nature of conceptual models used by researchers in understanding the etiology of drinking and alcoholism, (2) the special types of research methods needed to consider etiological questions, and (3) definitional and empirical issues related to continuity and discontinuity of drinking behavior.

Conceptual Models for the Development of Alcohol Use and Alcohol Problems

Conceptual models are useful for the scientist in a variety of ways. They organize the myriad details of information collected within a single study as well as across studies, and can provide the framework for a working understanding of process, of the time ordering of events, and of the different levels and types of input necessary to account for the phenomenon under study. They also serve to guide research by indicating what classes of events (variables) need to be measured and varied; they can serve as complex (or simple) theoretical statements about a set of hypotheses to be tested; and once the test(s) have been done they can be adjusted, revised, or discarded for new models that more adequately fit the observed phenomena. In all of these ways, when appropriately constructed and tested, models offer far more than the opportunity to abstractly theorize in the absence of evidence. Rather, as scientific understanding progresses, they allow the investigator to judge what is more important as compared with less important, and what to include and what to leave out in explaining a phenomenon. They also indicate when it is appropriate to stop. This latter point is usually considered to be reached when the model becomes accepted as the most useful and parsimonious conceptual structure of the way a phenomenon in actuality is.

These issues are of special and recent concern to the alcohol studies field, which in many ways is still attempting to define itself. Among the thousands of studies completed worldwide, not all of the existing work is important, even when it has been established to be statistically reliable and in that sense demonstrably real (Carpenter 1968; Zucker 1979). Even where areas of importance can be identified, the field is also well past the point where single factor theories of etiology are sufficient to handle the available data (Blane and Chafetz 1979*a*; Cahalan and Room 1974; Jessor and Jessor 1977; Kissin 1977). It is in this context that a number of recent state-of-the-art reviews concerned with questions of alcoholic and drinking etiology (Blane and Hewitt 1977; Kissin 1977; Nathan and Lansky 1978; Zucker 1979) have called for greater attention to (a) amount of effect accounted for by different classes of influencing factors and specific influencing variables, and (b) spelling out the ways in which these factors add together, potentiate each other, or serve as alternative pathways of influence. Both statistical and theoretical models need to be developed to account for interactional phenomena, as well as to guide new research endeavors.

Current Models for the Development of Alcoholism and Problem Drinking

A number of conceptual models at varying levels of sophistication have been developed in recent years to account for different facets of drinking activity. The National Research Center at Berkeley for well over a decade has worked out of an epidemiological framework and an essentially social problems approach in conceptualizing problem drinking—its relationship as a broader umbrella category to the narrower one of alcoholism—and in exploring its correlates and possible antecedents (Cahalan 1970; Cahalan and Room 1974; Roizen et al. 1978). The Berkeley group has conducted a series of fruitful cross-sectional and longitudinal surveys of problem drinking phenomena, their distribution demographically and in sociocultural space, and has begun to develop, first by use of a retrospective methodology and more recently with a prospective one, an account of the significant prognostic elements in later problem drinking among adults. Their approach has been largely inductive, guided by prior empirical findings involving smaller classes of variables at first, then widening out the variable network as significant correlative indicators are found. In their 1974 report four domains of predictors with potential etiological significance were examined: (1) social differentiation and childhood history variables (SES, age, family status, ethnoreligious membership, childhood unhappiness, family disruptions); (2) personality variables (impulsivity, alienation, psychiatric symptoms); (3) social situation and habit measures (home role and work friction, lack of neighborhood roots); and (4) drinking context variables including parents' drinking patterns (drinking in heavy intake contexts such as bars, perceived parental drinking patterns).

Richard Jessor and his colleagues at the University of Colorado have developed and used a formal sociopsychological theory of problem behavior, and a model derivative from it, in their studies of differences between problem and nonproblem drinkers, and of the transitions from nondrinking to drinking and from nonproblem to problem drinking among youth (Jessor et al. 1968; Jessor and Jessor 1977). The critical causative elements in the theory involve (l) antecedent-background variables concerning demographic and social structural background of the actor, and socialization influences including parental ideology, home climate, and peer and media influences; and (2) social-psychological variables tapping cognitive aspects of personality structure (values and expectations for achievement, independence and affection, personal beliefs involving alienation and esteem among others, tolerance of deviance, religiosity), and aspects of the perceived environment having primarily to do with parental and peer support, control, and modeling of problem behavior. These background and social-psychological variables in turn interact and contribute to actor behavior, involving alcohol use, problem drinking, and a variety of other potentially problem behaviors. Empirical support for the model has been generally positive, although it leaves substantial amounts of behavioral variance unaccounted for.

Midway between these two poles of initially inductive and deductive strategies in guiding the plan of research and the choice of variables to look at, one can find also a number of efforts to construct models as a more strictly heuristic device. Such models have been used in a variety of ways: (1) to organize already existing data in a way that makes the interrelationships clearer (U.S. Department of Health, Education, and Welfare 1978); (2) to group data in some theoretically meaningful way—before analyses are started, but after the data have been collected—so as to allow the investigators to anticipate and look for potential causative connections rather than engage in indiscriminate data analysis (Fillmore et al. 1979); or (3) to summarize existing knowledge in a way that systematically highlights parts of the process that are well understood, as well as parts that demand further inquiry (Kissin 1977, 1979).

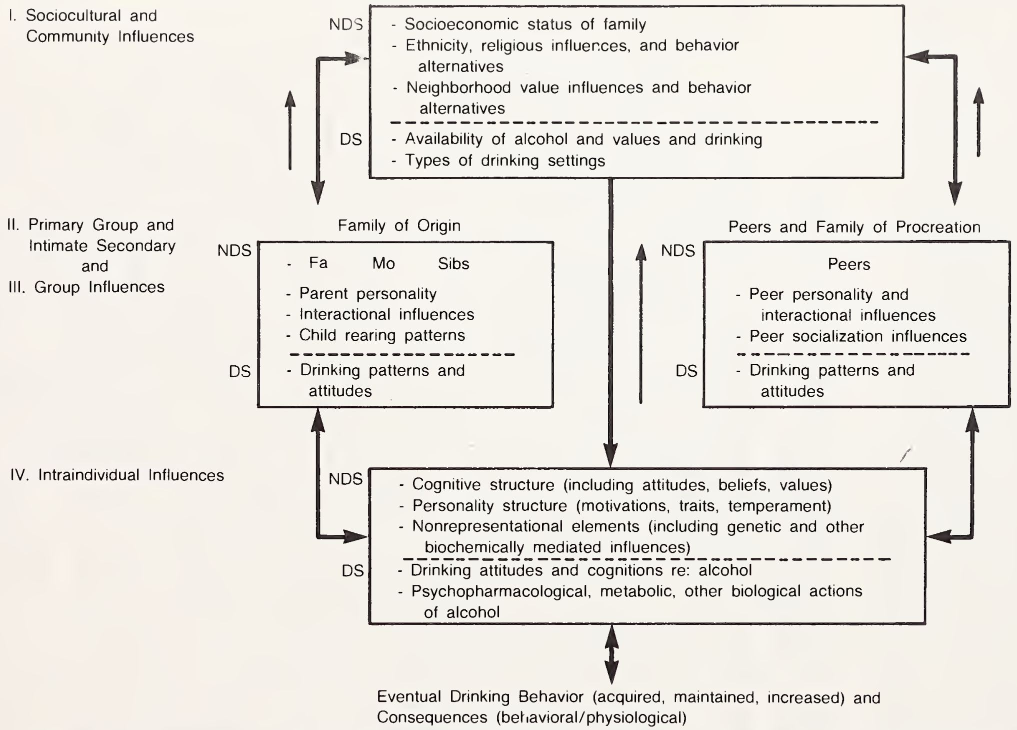
Kissin's model, although heavily elaborated on the psychopharmacological details of the process of the acquisition of alcoholism, and much less detailed on the social and psychological contributions to the process, deserves special attention as one of the few that takes formal account of biological, pharmacological, psychological, and social elements in alcoholic etiology.

A Framework for a Multilevel Approach to Alcoholic and Problem Drinking Etiology

While significant controversy still exists among researchers about the utility of formal theoretical models for alcohol problems (Keller 1979), an increasing number of scientists have recognized that empirical advances beyond a certain limit will probably not be made until alcohol problem research is more clearly integrated into the conceptual mainstream of the biological, psychological, and social science disciplines (Blane and Chafetz 1979*b*; Clausen 1978; Kandel 1978). Part of this process involves the ability to systematically link findings across research programs; part involves being able to clearly delimit those aspects of the "best guess" sequence of etiology that remain poorly understood and require further investigation.

One promising effort at generating such a scaffolding structure is the heuristic model originally presented by Zucker in 1976 and elaborated on in a more recent review (1979). The model was developed in an attempt to chart common pathways in the acquisition and maintenance of both normal and abnormal drinking behavior. It provides an organizing framework for influencing factors at two levels of interaction. The first level of interaction, depicted in figure 1, specifies the elements that need to be considered at any one time point in the developmental course (the cross-sectional relationships among influencing factors). Within the model—following on the well-documented observation that both alcohol-specific (proximal) and general (distal or nonalcohol-specific) factors routinely contribute to the prediction of alcohol consumption—the distinction is drawn between drinking-specific and nondrinking-specific contributions at all levels of influence.

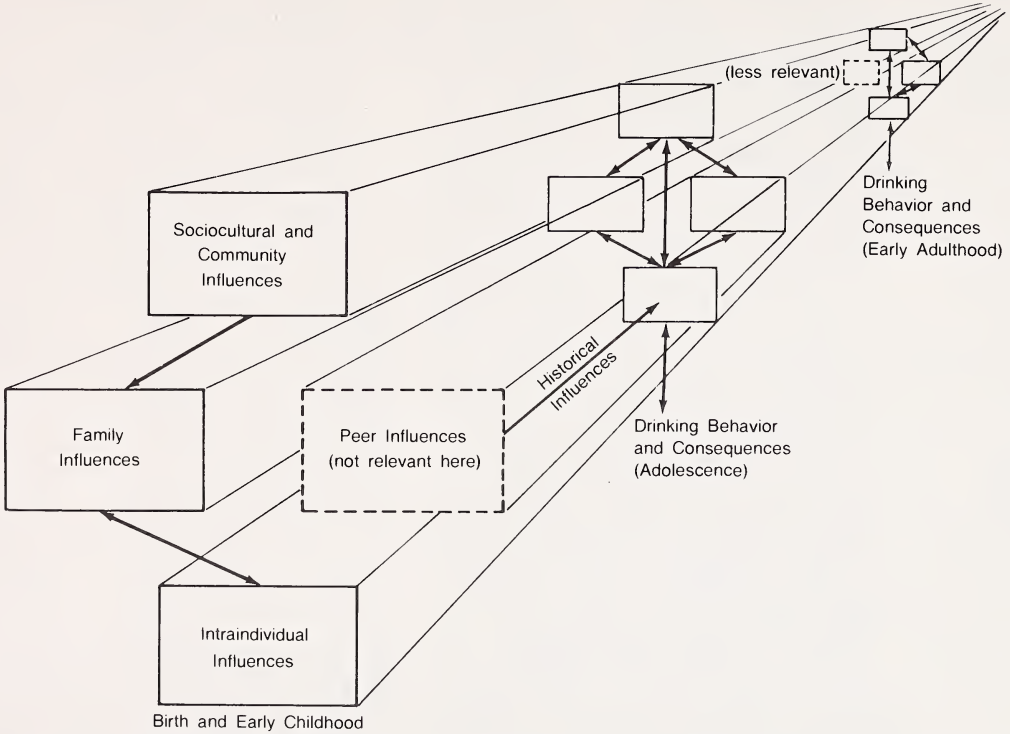
Figure 1. An Organizational Structure for Classes of Influences Upon Drinking Behavior


I. Sociocultural and Community Influences
NDS
- Socioeconomic status of family
- Ethnicity, religious influences, and behavior alternatives
- Neighborhood value influences and behavior alternatives
DS
- Availability of alcohol and values and drinking
- Types of drinking settings
II. Primary Group and Intimate Secondary and III. Group Influences
Family of Origin
NDS
- Fa Mo Sibs
- Parent personality
- Interactional influences
- Child rearing patterns
DS
- Drinking patterns and attitudes
Peers and Family of Procreation
NDS
Peers
- Peer personality and interactional influences
- Peer socialization influences
DS
- Drinking patterns and attitudes
IV. Intraindividual Influences
NDS
- Cognitive structure (including attitudes, beliefs, values)
- Personality structure (motivations, traits, temperament)
- Nonrepresentational elements (including genetic and other biochemically mediated influences)
DS
- Drinking attitudes and cognitions re: alcohol
- Psychopharmacological, metabolic, other biological actions of alcohol
Eventual Drinking Behavior (acquired, maintained, increased) and Consequences (behavioral/physiological)

SOURCE: Adapted and reproduced with the permission of the author and the publisher from Zucker, R.A., Developmental aspects of drinking through the young adult years. In: Blane, H.T. and Chafetz, M.E. eds. Youth, Alcohol and Social Policy. New York: Plenum, 1979 pp. 91–146. Copyright 1979 by Plenum Publishing Corporation.

[1] NDS refers to nondrinking specific factors; DS refers to drinking specific factors.

Figure 2. A Heuristic Model for Changes in Influencing Structures Affecting Drinking Behavior Over Developmental Time



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Class I influences are concerned with variables of both the culture and the immediate community. They are seen as setting the stage for possible drinking behavior, both at any one time point and in developmental-historical time; they are seen as having stronger impact on the person than is true reciprocally, hence the arrows of greater length outward. They very directly influence Class II variables insofar as they specify the groupings of work, play, and intimacy, and the freedom for movement in such groupings that both family and the peer group have available to them in socializing the individual. Class I variables clearly have very direct influence in the sense that individual drinking cannot occur if beverage alcohol is unavailable; they also provide the range of settings in which drinking can take place.

Classes II and III are concerned with the effects of primary and intimate secondary group members on drinking behavior. Class II focuses on the primary socialization agency, the family, and its multiple levels of influence. These include both drinking-specific and nondrinking-specific variables, and both direct and indirect effects. Direct influences are primarily those relating to socialization to alcohol use and to types of behavior acceptable within and outside of the family unit. Indirect effects occur via the parents' modeling of their own adaptations to alcohol and their indirect communication via their own behavior of standards of acceptable conduct.

Class III elements parallel family processes in that they also can be direct socialization effects, can produce change via modeling, and relate to both drinking experience and nondrinking-specific behavior. Both types of influence are depicted with arrows showing effects in two directions; these effects are seen as being interactional, or more appropriately as transactions, in the sense that both the individual and the other parties to the influencing process mutually have impact upon each other (Braucht 1980; Sameroff 1975).

Class IV elements focus on within-the-individual influences. They cut across a number of data levels, including (a) psychological structures such as attitudes and personality patterns; (b) temperament, which encompasses behavioral style, and might on the one hand be considered a personality variable, yet on the other clearly also is a partial representation of constitutional factors; and (c) physiological influences insofar as they may determine predisposition to alcohol use and individual differences in the way it is absorbed and metabolized, and the effects it has on autonomic and central nervous system functioning.

The second level of interaction specified by the model focuses on interactions and changes in the salience of these influences over organismic time. Figure 2 is a representational attempt at depicting this; it illustrates how the structure might change as the person matures. Classes of influence not relevant at one point (e.g., peer influences at birth and early childhood) come into play at another point (e.g., adolescence); others, such as family effects, lessen their importance as developmental time progresses. For the purposes of illustration, only three time points are depicted here, although in actuality the structure is a continuous one, with the relative contributory strength of influencing variables and classes represented by greater or lesser areas of each of the rectangles.

This conceptual structure will be used as an organizing framework for ongoing research on etiology. Before doing so, some brief attention to the current status of research designs is called for, with specific attention to the way in which etiological connections, or "causes," can be established.

Methods and Designs

It is a well-known scientific dictum that correlation does not establish causation. Two events, A and B (e.g., noting that alcoholics are more likely to involve themselves in aggressive activity) that are associated (found at the same time) may be linked because event A "caused" event B at an earlier time, event B "caused" event A, or, alternatively, both A and B were caused by a third, unmeasured event that the investigator cannot therefore specify. Such research methods are known variously as correlational, associational, or cross-sectional. Although they are plausible sources of hypotheses about etiology, they firmly establish nothing about precedence, and are therefore unreliable sources of information in establishing it. Unfortunately, a great deal of the current knowledge we have about alcoholic and problem drinking etiology was established by way of these designs. Insofar as the accumulated data from them is currently unverified, a considerable amount of what is currently believed to be fact may be resting on shaky foundations.

Increasingly in the last decade and especially within the last 5 years, investigators in the alcohol field have become sensitized to these issues (Cahalan and Room 1974; Clausen 1978; Fillmore et al. 1979; Jessor and Jessor 1977; Kandel 1978; Lazarsfeld 1978). A variety of differently conceived methodologies have evolved that have as their general focus the capacity to establish with greater precision the time ordering of events that is so necessary to put causal statements on firmer ground. Virtually all of them involve attempts at longitudinal study—i.e., the collection of data on the same individuals covering at least two time points in each person's history.

Longitudinal studies, when properly designed and properly analyzed, offer the possibility of establishing temporal order and sequence, can yield useful information on temporal covariation, and, when involving more than two time points, allow the investigator to predict in much the same way as an experimental scientist makes predictions about the outcome of different experimental treatments (Achenbach 1978; Gaines and Zucker 1980; Jessor and Jessor 1977).

These research strategies are, however, not without their problems (Garmezy and Streitman 1974; Labouvie 1976; Labouvie et al. 1974; Mednick 1978; Shanks 1975). They are costly, difficult to execute, and when planned over long periods of time make unusually heavy demands of the researcher's commitment. When the perspective is one of high-risk methodology, the yield of later-to-be alcoholic or problem-drinking persons is usually small in comparison to the sophisticated techniques and conceptual models that are still very much in the process of being developed. And even with this developing conceptual and analytical sophistication, there is still significant disagreement about the extent to which these methodologies can approach the experimental method as a way of establishing causality (Bentler 1978).

One modified approach, the convergence or combined cross-sectional/longitudinal design (Schaie 1965) represents a compromise strategy in length of commitment needed before data become available. It has been used with some success to research other areas of development and the etiology of psychopathology, but its application to research concerning alcohol problems and alcoholism is still in its infancy. The one study currently utilizing it (Carpenter and Lester 1979) is still in progress.

Despite this considerable list of difficulties, there is substantial agreement among investigators that the longitudinal method and its variations represent the best, albeit imperfect, approximation to understanding etiological questions that is currently available. Its cost and methodological difficulties suggest that it not be used indiscriminately. But when carefully applied to areas where etiological hypotheses are clear enough to be subjected to the most rigorous tests available, it is the method of choice. The remainder of this report summarizes the knowledge currently available from longitudinal and related methodologies, and then deals with their implications.

Longitudinal Research on the Development of Alcoholism, Problem Drinking, and Normal Drinking

Longitudinal Research on the Development of Alcoholism

Two recent reviews by Zucker (1976, 1979) summarize the studies in this area. With the exception of the Oakland Growth Study (Jones 1968, 1971)—whose subjects were all comparatively well-functioning adults better characterized as problem drinkers—the studies utilized clinical diagnoses of alcoholism, albeit of varying degrees of severity. Major findings concerning parental influences (what would be classified as Class II influences according to figure 1) relating to later alcoholism are shown in table 1. Findings relating to major Class I and Class IV influences are in table 2. (Class III influences, concerning peer effects, are notable for their absence in these studies.)

The parental influence findings (table 1) show across-study consistency in some areas and substantial variation in others. Some of the

Table 1. Parent Characteristics During Childhood and Adolescence Related to Alcoholism in Adulthood (Longitudinal Studies)

	McCord and McCord (1960, 1962)	Robins et al. (1962) Robins (1966)	Jones (1971)	Berry (1967) Ricks and Berry (1970)
Childhood characteristics and source or probands	Predelinquent males, identified for a youth project preventive program, blue-collar	Males and females, childhood psychiatric clinic patients, primarily blue-collar, heavily court and social agency referred	Males (M) and females (F) Oakland Growth Study, primarily middle class	Males, child guidance clinic patients, mixed social class
Age at first contact	10	Median = 13	10	11-16
Time to followup	20+ years	30 years	3 contacts, at 23, 28, and 33 years	Adulthood
Criterion for adult diagnosis	Public records (hospital, welfare, court)	Personal interview data and public records	Extensive interview data and medical exam	Hospital diagnostic record
Characteristics of control (comparison) samples	Predelinquents from same study with no public record of alcohol problems	1. Other clinic patients not diagnosed alcoholic 2. Elementary school pupils without school behavior problems, matched for residence, sex, and age	Growth Study subjects who were not diagnosed problem drinkers impulsive character	1. Other clinic patients later diagnosed schizophrenic or 2. Clinic patients later socially adequate

Table 1. Parent Characteristics During Childhood and Adolescence Related to Alcoholism in Adulthood (Longitudinal Studies)

	McCord and McCord (1960, 1962)	Robins et al. (1962) Robins (1966)	Jones (1971)	Berry (1967) Ricks and Berry (1970)
Family affectional interaction	1. Intense parent conflict and antagonism 2. Sexual deviancy by parents 3. Denigration of mother by father 4. Maternal alteration between active affection and rejection of son 5. Active paternal rejection	1. Divorced or separated parents 2. Paternal cruelty/desertion 3. Some time lived away from parents 4. Incest/illegitimacy among parents 5. Parental inadequacy 6. Parental loss via death	1. Mother sour and disagreeable (M,F) 2. Family conflict, also true in abstainers (F) 3. Mother uninterested in child (M) 4. Mother less cheerful than most (M)	1. Moderate or mildly disturbed compared to schizophrenic and impulsive character 2. Family more chaotic than socially adequate boys
Parent reward structure (positive and negative)	1. Maternal escapism from family crises 2. Maternal resentment of her family role 3. Paternal escapism from crises 4. Absence of high parental demands for child	Lax discipline	Mother uninterested in in child (M)	1. Parents stimulated social deviancy 2. Low standards of achievement and conduct

Table 1. Parent Characteristics During Childhood and Adolescence Related to Alcoholism in Adulthood (Longitudinal Studies)

	McCord and McCord (1960, 1962)	Robins et al. (1962) Robins (1966)	Jones (1971)	Berry (1967) Ricks and Berry (1970)
	5. Subnormal restrictiveness by mother 6. Lack of supervision 7. Friendly outsider in conflict with parents over expectations for child			
Parental modeling alternatives available	1. Sexual deviancy by parents 2. Mother antisocial or alcoholic 3. Paternal deviance (control group) 4. Low maternal religiosity	1. Antisocial father (alcoholic or criminal) 2. No relation to mother's deviance 3. Parental loss via death	1. Father excessive drinker (F) 2. Mother dissatisfied with lot in life (M and F)	No data available

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variation probably can be attributed to study differences in the socioeconomic strata from which the later alcoholics were drawn, and some can be accounted for by problems in the study designs. The two followback (Garmezy and Streitman 1974) studies (Berry 1967; McCord and McCord 1960)—as opposed to those using a followup methodology—are both likely to bias results toward severity of findings since potentially at-risk persons who later elude agency contact (problem drinkers or alcoholic, but adequately functioning persons) are excluded from the study design.

Consistencies involve disturbances in the quality of family affection giving, family conflict—particularly between the parents but also sometimes involving the child, inadequate rather than harsh disciplinary practices, and the lack of provision by parents of adequate models for adulthood. Variation is most evident concerning the amount of parental deviance reported, and to a lesser degree in the amount of harshness/rejection found in parent-child interactions.

Findings relating to intraindividual factors (Class IV influences) and the few Class I influences (concerning sociocultural background) focused on by these studies—shown in table 2—are somewhat more consistent than the parental influence data. In contrast to the old clinical notion which viewed alcoholics consistently as dependent, ostensibly also in childhood, these investigations show consistent independence and confidence among prealcoholics, at least in adolescence. They also are in agreement about earlier impulsivity, and higher, possibly hyperactive activity levels. The one other longitudinal investigation in this area (Hoffman et al. 1974; Kammeier et al. 1973; Loper et al. 1973) within its limited data base was also consistent with these findings.

One obvious deficiency, even within the context of the small group of longitudinal studies now extant, is the relative absence of data on the developmental course involved in women's alcoholism. Only the St. Louis Study (Robins 1966) and the Oakland Growth Study (Block 1971; Jones 1971) included women, and the detailed analyses in the St. Louis report are based only on male patients. The California study sample was largely middle class and was at least nominally focused on problem drinkers, although the data presented suggest that, according to recent research criteria (Feighner et al. 1972), these subjects were more likely probable alcoholics. A pattern of emotional inadequacy, pessimism, self-defeat, and vulnerability is observed in these women as junior and senior high school students. In addition, they were seen as submissive as youngsters, rebellious as adults, and undergoing a number of changes during this transition.

Issues and Research Needs Relating to Alcoholic Etiology

The longitudinal findings on alcoholic men show a number of parallels with cross-sectional studies on alcoholic (Ablon 1976; Jacob et al. 1978; Orford et al. 1976; Wilson and Orford 1978) and adolescent

Table 2. Class I and Class IV Characteristics in Childhood and Adolescence Related to Alcoholism and Problem Drinking in Adulthood

	Investigator					
	McCord and McCord (1960)	Robins et al. (1962)	Robins (1966)	Jones (1968)(males)		Berry (1976) Ricks and Berry (1970)
	Adolescent Characteristics					
Class I Influences						
Background influences		Disproportionately male, Irish, lower SES	Blue-collar background (M)			
Class IV influences						
Interpersonal behavior	Outwardly self-confident Disapproving of mothers Coolness-indifference to siblings		Runaways	Jr. H.S.	Talkative Assertive Less dependent Less accepting of dependency (also Sr. H.S.) Less considerate Other directed Negativistic	Antisocial behavior with peer group ties and loyalties
				Sr. H.S.	Less aware of impression on others	
Impulsivity and management of aggression	More agressive More sadistic	Antisocial	Record of theft and other serious offenses (M)			
Temperament	Undisturbed by abnormal fears Hyperactive			Jr. H.S. Sr. H.S.	Expressive Rapid tempo	
Other	Fewer abnormal fears Neural disorders	More often problem children (clinic-referred)	Out late School truancy (M) Eating problems or underweight Daydreaming and inattention Nail biting	Jr. H.S.	Pushes limits Self-indulgent Sensuous Initiates humor	
				Sr. H.S.	Less productive	

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problem-drinking families (Jessor et al. 1968; Zucker and Barron 1973; Zucker and DeVoe 1975). Lack of family cohesiveness, parental deviance, and inadequate or inconsistent parenting rather than rejecting parental behavior have all been found using both research strategies. At the level of intraindividual influences, heightened impulsivity, antisocial behavior, and increased involvement in a wide variety of other deviant activities have been clearly associated in cross-sectional investigations with the greater likelihood of being a problem drinker (Costello et al. 1978; Demone 1973; Schuckit and Chiles 1978; Williams 1970; Zucker and Fillmore 1968). Temperament and activity differences, possibly with a neurological basis, have also been identified, via both retrospective and cross-sectional methods, as another potential kind of etiological precursor to later alcoholic behavior (Cantwell 1972, 1978; El-Guebaly and Offord 1977; Goodwin et al. 1975; Lund and Landesman-Dwyer 1978; Morrison and Stewart 1971).

The presence of these correspondences is tempting bait both for the layman and for investigators who are not familiar with the intricacies of the etiological literature. They offer a promise that is suggestive rather than definitive, and the possibility of reaching firm conclusions about etiology that are more apparent than real. The special and essential issues that remain unanswered are as follows.

1. With the exception of the Oakland Growth Study, all of the longitudinal studies traverse only two time points and thus leave unclear whether the common characteristics isolated simply predate later alcoholism, or are, more precisely, necessary etiological precursors. The same conclusion holds true even more firmly for the cross-sectional and retrospective studies.
2. Class III influences, concerned with interpersonal effects, are notable by their absence. Yet the studies on problem-drinking etiology—to be reviewed in the next section—strongly implicate these factors as some of the most powerful (if not the most powerful) etiological triggers. One just-published longitudinal study on the development of alcoholism (from college age onward) also implicates contemporaneous Class III influences (Vaillant 1980). Our knowledge base here has a serious gap that needs rectification.
3. There is still virtually no evidence on the relative importance of drinking-specific as compared to nondrinking-specific influences as potential etiological contributors. Historically, this is quite understandable in terms of the era when most of the existing longitudinal research was conceived and carried out. But current evidence, again more from studies of problem drinkers than of alcoholics, strongly implicates attitudes about alcohol both by self and among peers as of potentially strong etiological significance.

Furthermore, it can too easily be assumed that such attitudinal factors come into play only once drinking commences. Recent developmental research on attitudes of children as young as 4 years of age indicates not only that attitudes about alcohol are developed long before drinking starts, but also that such attitudes are quite positive and more consistent with later drinking behavior than are the generally negative attitudes of the middle childhood and early teen years (Jahoda and Cramond 1972; Penrose 1978; Zucker 1979). The evidence is far too scanty at this point to be able to judge whether such early learning has long-term etiological implications, but it very definitely needs to be explored.

4. With the exception of the McCords' work, all of these longitudinal studies have used a univariate approach to data analysis. Statistics used also make it impossible to evaluate the relative amounts of explained variance accounted for among the multiplicity of specific findings. Thus what is construed in these studies as etiologically significant in fact is still unsubstantiated. The issue of which influencing factors are etiologically most important, and which less so, remains completely open. Multivariate strategies, guided by conceptual models that specify and justify in advance the types of variables to be assessed, are very much needed to rectify this situation.
5. Along with the development of multivariate models and theoretically guided data collection strategies, it is imperative to conduct follow-through research strategies utilizing multiple cohorts, over considerably more than two time intervals, that are closely enough spaced to allow specification of the critical periods for effect of different etiological factors. Developmental patterns in many areas of behavioral pathology starting in childhood are frequently not linear, and influences that have impact at one time period frequently have none or a different effect at an older age (Anthony 1970). There is as much reason to look for "critical periods" that may operate in the development of alcoholic etiology as there is in other areas. Knowledge in this sphere is at this time nonexistent.

A related methodological difficulty with all of the longitudinal work reviewed so far is that study findings are based upon a single cohort of subjects. This results in confounding findings attributable to aging, specific historical (or era) effects, and effects attributable to the specific characteristics of the cohort sample. Correspondences in presumed etiology between the Jones (1968, 1971) and Vaillant (1980) studies, along with differences from the other studies reviewed here, appear to be due to different cohort characteristics; but the nature of the longitudinal designs used makes it impossible to establish this with any confidence.

The longitudinal project currently being conducted by the National Research Center at Rutgers, and begun within the last year, has the potential for rectifying a great many of these problems, at least for age 13 and thereafter. In addition, its multivariate conceptualization and data collection plan—ranging across a number of areas from the biological to the sociological—promises a more thorough comparison of all four classes of influences than has previously been done.

6. The earliest longitudinal study begins at age 10, and the majority of them start in early adolescence. Thus knowledge of possible earlier influencing events of a critical kind is also nonexistent. This state of affairs clearly also needs correcting.
7. In recent years in other areas of research on vulnerability to psychopathology—such as schizophrenia—considerable attention has been paid to the development of so-called "stress-resistant" or invulnerable children. Garmezy (1976, 1981) eloquently argues that etiological studies should be focused extensively on conditions and individual characteristics that lead at-risk children away from breakdown or disturbance, as well as on those characteristics which potentiate risk.

There is evidence, at least in the later years of alcoholic disorder, that such insulation from further breakdown occurs by way of "spontaneous" remission. Followup studies of both socially disadvantaged, clinically diagnosed, alcoholic groups (Goodwin et al. 1971) and alcohol abusers in the general population (Roizen et al. 1978) show remission rates from alcoholic disorder to nonproblematic rates of drinking averaging over 40 percent. At the other end of the developmental age range, even with the increase in risk for alcoholism engendered by having an alcoholic parent, well over half the male offspring of such families do not themselves become alcoholic. The search for factors that insulate in childhood against later alcohol problems should proceed apace with the search for elements that contribute to etiology. These elements are not necessarily the obverse of each other. New research is clearly called for in this area.

8. The Oakland study (Jones 1968, 1971) is only a beginning effort at understanding the differences/similarities in alcoholic etiology among men and women. The pattern of findings, particularly in the high school data, suggests that later-to-be problem-drinking women show a more depressive adaptation in youth, while the men show a more impulsive one. These findings are suggestive of the possibility of different etiology and different courses for the two sexes. An early and high priority is for other investigations that can more clearly trace and explain the unfolding of these phenomena in both sexes.

Longitudinal Research on the Development of Problem Drinking

The line between what is called alcoholism and what is variously called problem drinking or alcohol abuse is a fine one, and to some extent quite arbitrary. There is not much question that when differences between alcoholic and problem-drinking groups are examined, in the aggregate, the former are more likely to have problems of greater number and of greater intensity: symptomatic distress of greater severity, a more profound involvement with alcohol that invades other areas of behavior and adaptation, and greater contact with social agencies such as hospitals, police departments, and welfare and unemployment offices. However, significant disagreement exists about the extent to which such differences may be reflective of (1) observations made on the same generic population, but at different points in the developmental course of the pathology, (2) generically (and etiologically) different populations, or (3) characteristics related on the one hand more to nonalcohol-specific etiology, such as inadequate social functioning, or on the other hand to simple alcohol-related sequelae.

Four of the five longitudinal studies of problem drinkers address these issues directly (Cahalan 1969, 1970; Clark and Cahalan 1976; Fillmore 1975; Fillmore et al. 1979; Roizen et al. 1978). These four used subject groups who at the start of the research were between 18 and 59 years of age, i.e., when by far the majority have already been drinking for several years at the least. Because of this the data are useful in tracing drinking and problem-drinking course but not in establishing precursors for drinking and early alcohol abuse. Only one, the Colorado study conducted by Richard Jessor and his associates (Jessor and Jessor 1973, 1977), attacked this earlier developmental problem in two studies covering males and females initially ages 13 to 15 in the high school study, and age 19 in the college study.

Utilizing the conceptual framework discussed earlier in this review, the Jessors attempted to predict transition behavior in a variety of areas, including those relating to starting to drink, moving from drinking to problem drinking, and moving from problem drinking back to a more normal drinking pattern. Drinking is viewed within the context of problem behavior theory; engaging in either drinking or problem drinking, at least in adolescence, is seen as a move away from the regulatory norms of the larger culture. The general hypothesis tested is that at a variety of levels—including those of values and of environmental linkages to social and institutional support systems—onset or increases in deviant behavior will occur at, or immediately following, the transitions in values and in environmental linkages. These transitions themselves, involving shifts from valuing achievement to valuing independence, and shifts from perceived greater to perceived less parent-peer compatibility, are seen as moves away from the conventional normative structure of the culture.

The Colorado study data generally confirm the theory, although not unequivocally. Prediction of the onset of problem drinking was successful in one set of analyses, involving a subsample of the high school study (Jessor and Jessor 1973), but not in the later analyses on the full high school sample nor in the college study (1977). In addition (and possibly for sampling reasons), no success was achieved in anticipating the transition back from problem-drinking to nonproblem-drinking status. Prediction of time of onset of drinking was considerably more successful, however, and the theory undoubtedly still holds promise, both as a generator of useful empirical measures, and as a conceptual framework that makes some effort to cut across all four levels of influence detailed in figure 1.

From the standpoint of a developmental theory of drinking, the Jessors aptly make the point that the critical issue in determining the contribution of influencing structures involves not which influencing structure (e.g., environmental or personality influences), but rather the closeness of the particular variable in question to the outcome behavior. On these grounds, appropriately, one would expect attitudes about alcohol and drinking behavior of relevant models to have more immediate impact than would nondrinking variables having to do with parent supports or parental controls. Both sets of factors may contribute, but the more proximal ones would do so more strongly. The data in general bear this out.

Fillmore and colleagues' (1977, 1979) followup after a 25-year interval of a subsample of participants in Straus and Bacon's (1953) college drinking study provides an important contribution to current knowledge about the shifts in patterns of drinking and problem drinking in adulthood, albeit with a group of responders biased toward the educated, white, and middle class. Evidence for low order stability across this time frame was obtained for both drinking and problem drinking, along with a significant amount of data pointing both toward discontinuity of process over this long a time interval, and for basic differences in process underlying the phenomena of drinking and problem drinking for women as compared with men.

The nature of drinking problems for both sexes was different in the middle forties than at age 20. Overt alcohol problems relating to early negative consequences in men are less predictive of later alcohol difficulty than is the extent to which the person is involved with alcohol and shows incipient rather than blatant signs of alcohol difficulty. For women, greater identification with the use of alcohol, but little overt trouble in the younger years, along with the involvement in social and personal situations of later life that encourage alcohol consumption are predictive of later problems. For both sexes, life cycle achievements in the intervening period significantly modify patterns of problem and nonproblem use with advancing developmental time.

The Social Research Group studies (Cahalan 1969; 1970; Clark and Cahalan 1976; Roizen et al. 1978) also provide support for a discontinuity view of alcohol problems in the general population. Using samples that were more representative of age and socioeconomic range than was true of the Rutgers study, and a more varied set of measures that assessed personality (Class IV) influences more thoroughly, they also found significant shifts from nonproblem- to problem-drinking status and vice versa, over an interval as small as 3 to 4 years.

Elements that anticipated shifts to problem drinking were transition related (recent deaths, divorce, separations), attitudinal (lack of satisfaction in reaching life goals), personal (greater impulsivity, alienation), and environmental (spending evenings out, greater "social" drinking).

Generally, factors that anticipated the shift away from alcohol abuse were the obverse of these.

Issues and Research Needs Relating to Problem-Drinking Etiology

Reconsidering the issues raised at the beginning of this section, currently available studies—even with their methodological deficiencies—point in two disparate directions.

1. Evidence from youthful and adult middle-class samples point to the importance of life transitions (Levinson 1978) as significant etiological factors in the kind of drinking and types of problems that will take place. These data are thus supportive of a discontinuity view of the etiology of alcohol problems.
2. In contrast, evidence from larger population surveys, but where at least in one instance treated alcoholics are excluded, points both to the substantial occurrence of drinking symptom changes (remission in some, increase in others) and to substantial (35 percent in one study) stability in one subsegment of the population. The evidence thus is suggestive that, to a degree, arguments of continuity versus discontinuity of alcohol problems are reaching the point of polemic rather than dealing with the issue of identifying differences between these two etiological subgroups. In fact, the longitudinal data as well as those from other epidemiological, cross-sectional work suggest that age is one potentially strong differentiating factor. Even severe younger problem drinkers are more likely to show change in their drinking patterns. One excellent recent review by Blane (1979) goes so far as to suggest that this age-limited pattern be called another "alcoholism," named *frequent heavy drinking*. This is a potentially promising categorization of problem drinking that deserves careful examination in future work.

There are also suggestive, across-study commonalities. The adolescent data, as well as all of the adult studies, either directly or indirectly implicate the importance of attitudinal (cognitive) factors related to drinking, immediate situational influences (environmental supports for heavier consumption), and the influence of immediate social networks (most important, the family, whether it be one's parents when younger or spouse when older) in enhancing problem drinking or serving as an "insulation" against abusive consumption.

Less clear are the longer term effects of personality predisposition and earlier experience either of self or within the family of origin in enhancing, suppressing, or encouraging variability of problem drinking in adult life. This is in part due to the lack of commonality of independent variables used in the different studies, making it unclear whether the absence of findings can be attributed to failures in replication, or simple oversight concerning the potential etiological contribution of these influences.

From an etiological standpoint, there are a number of currently unsettled issues in addition to those already suggested that still require attention:

1. Despite the increasing sophistication of research designs in the last decade, there is still a tendency in most of the existing studies to rely on empirically derived models of etiology, or to choose heuristic structures in developing methodologies that are based heavily on one, or at most two, disciplinary frameworks. Such approaches still encourage simplistic explanations of alcohol abuse phenomena. They also make it difficult to evaluate the extent to which sources of predictive variance found by different investigators and attributable to different classes of influence are genuinely replicable.
2. More than 30 years ago, Bacon (1945, reprinted in 1972) aptly documented the ways in which alcohol use interacts with human functioning in complex societies. The empirical studies of the 1970s are only beginning to document the complexity of this process, whereby drinking not only affects the individual and renders him or her more or less capable of engaging in certain activities, but also where the activities of work and play, of interaction with others, and of times of being alone, in turn also influence patterns of consumption and patterns of abuse in different ways at different times during the life cycle in American culture. The Colorado and Rutgers studies are beginning attempts at empirically documenting the complexity of this process, but in ways that are fruitful in being able to understand the vagaries of alcohol-abusive etiology. More such conceptually rich research is needed, that maps out shorter time intervals, and that assesses stages in the development of the process over more than two time intervals. As H. L. Mencken once said, "For every complex question there is a simple answer. . .and it is wrong."
3. The studies concerned more strictly with alcohol etiology show substantial content overlap with studies of problem drinking. The former, however, for conceptual reasons, have contributed significantly more information on the role of predrinking influences on later problem outcomes. This is one area that has been relatively neglected in studies of problem-drinking etiology. It still needs rectification.

Longitudinal Research on Drinking Onset and Maintenance of Normal Drinking Patterns

One major study concerned with onset, that of the Colorado group, has already been reviewed in this report. It emphasized the importance of viewing the beginning of drinking as a transition activity, involving moves away from the normative structure of the society and greater involvement with peers and less with parents, and the importance of individual values and personality characteristics concerning independence and involvement in deviant activity of other transgressive kinds, as other significant parts of the developmental process. Other studies flesh out this picture in considerably more detail. In these respects the onset and maintenance literature shows greater conceptual and methodological sophistication than is true in the other areas reviewed here.

Cross-sectional studies in this area also point to an association between subject's drinking or nondrinking and friend's drinking (Alexander and Campbell 1967; Globetti 1964; Rachal et al. 1975). These studies also report significant, phenomenologically experienced pressure that nondrinkers report when a significant number of their close friends are drinkers. One might conclude, as an easy next step, that peer pressure causes the nondrinker to make the transition to drinker status. Other longitudinal evidence suggests that the process is a more complex one. A recent study of drinking onset phenomena finds that perceived peer behavior (drinking and other legal drug use), and involvement in peer activities (e.g., dating, parties), in fact anticipates later use of distilled spirits by earlier nonusers (Margulies et al. 1977). Nevertheless, other aspects of the external environment (e.g., paternal drinking—a Class II influence) and the internal one (adolescent's own earlier involvement in minor delinquent activity, prior to other drug use) are equally if not slightly more powerful in predicting onset. This study also found clear developmental effects. Breaking down their data by class in school, the authors found that friend influences become increasingly more influential as students progress through high school, while parent modeling effects remain steadily influential rather than decreasing with maturation. Lastly, in contrast to the Colorado work (Jessor and Jessor 1975), the Columbia study found clear sex differences. Parent influences (father's drinking, closeness to father) and perceived environmental pressure (modeling effects based on perceived extent of friends' drinking) predicted onset in girls, but not in boys. Among the latter, respondent's involvement in peer activity (dating and the like) and participation in politics were more powerful variables. Why these differential parent influences might be operating still remains unexplained. Cross-sectional data on childrearing interactions between sex of parent, sex of child, and the resultant behavior between the two are suggestive of differential cross-sex socialization practices, which in turn affect the child's openness to drinking (Zucker and Barron 1973; Zucker and DeVoe 1975). More work is needed to trace out the precise pathways of these influences.

Cognitive (Class IV) Developmental Issues Related to the Drinking Transition

In all of the work discussed so far, including that related to alcoholic and problem-drinking etiology, developmental issues are brought in by the back door. The data points for assaying differences related to drinking and nondrinking have usually been selected to cover middle to late adolescence. In these respects some attention is paid to the notion that chronological age, and presumed change related to it, makes some difference. Nevertheless, developmental processes within the individual are largely ignored in data sampling and are almost completely ignored in accounting for the results.

This is not the case in one very important, albeit cross-sectional, study of cognitive factors related to the development of attitudes toward alcohol use. The work, done by Jahoda and Cramond (1972) in Glasgow, demonstrates the importance of interactions between intraindividual developmental factors (age, stage of cognitive development), parental influences, social structural influences, and child personality in determining attitudes about alcohol use.

Utilizing a Piagetian frame of reference in devising age-appropriate experimental tasks and stimuli, these investigators explored the development of conceptual structures (cognitive representations) and attitudes concerning alcohol in three age groups (6-, 8-, and 10-year-olds), and also collected some data on a small 4-year-old sample. The authors stress the fact that assessment of alcohol-related cognitions must be set within the framework of the child's more general capacity for cognitive processing. The data convincingly demonstrate the importance of using age relevant dependent variables and highlight the importance of understanding developmental changes in the capacity to process information, as these relate to the responses that children give. For example, where recognition of alcohol as a discrete type of beverage is developmentally possible at all, the findings indicate very early exposure and no demonstrable learning over time; all of the changes in recognition of alcohol via smell are attributable to maturational changes in cognitive capacity.

A number of provocative conclusions can be drawn from the Jahoda and Cramond study.

1. Given that early childhood impressions are both favorable to alcohol and that the great preponderance of younger children anticipate drinking in the future, this earlier learning, when coupled with observations of peer drinking in adolescence may very well be a part of the learning-to-drink process. One clear need is for studies to evaluate the relative potency of these two sources of effect. Heretofore most explanations of drinking acquisition have presumed it to be entirely a function of learning during adolescence, undoubtedly in part because the contribution of earlier attitudinal influences was both unknown and unassayable.
2. Cognitive inputs after ages 8 to 10 probably do not have impact upon earlier cognitive structures; instead, what seems to happen is that a negative attitudinal structure is learned, which is in accord with the somewhat negative institutional values implanted by both parents and teachers. Yet it can be argued that if core

(earlier) attitudes about drinking are to be truly modified, new learning should build upon the more positively toned earlier attitudes.

3. Education about alcohol by ages 12 to 14, which is primarily oriented toward the modification of cognitions about alcohol, is being conducted at the developmentally most inappropriate time. There should be peak resistance to such inputs during this developmental era because negatively toned education is being offered at a time when there is maximum observational learning of an opposite message from peers—viz., that learning to drink is fun and may also provide increasing affective involvement with those most important to the student—i.e., his or her peers.

Issues Relating to Changes in Normal Drinking Patterns Over Time

One issue that is as yet unexplained in any detail concerns the timing of transitions or shifts in drinking behavior. Even the Colorado studies do not predict time of onset except to specify that when some sociopsychological factors shift, drinking onset will occur. Several other short-term longitudinal investigations partially address this issue by way of investigations of transition behavior itself. Typically the studies have been of the shift from high school to either work or college (Alexander and Campbell 1970; Campbell 1964; Johnston 1973; Johnston et al. 1978). In all of this work, changes in drinking to greater levels of consumption were observed with changes to these new social settings. Not only did drinking patterns shift, but changes were observed also in choice of friends, church attendance, and interests in school. For the minority who did not shift, their pattern of peer associations, church attendance, and the like shifted to reinforce their now nonnormative (either abstinent or lower level) consumption. The point of these investigations is that they implicate the physical and ecological change to a new social system as a trigger for the timing of the drinking shift.

Given that not all drinking shifts occur at these transition times and that not all individuals shift, other factors need to be brought into the explanatory equation. Several other short-term longitudinal studies (Jung 1977; Kaplan and Pokorny 1977) suggest that Class IV influences related to personality and motivational variables are at least part of this. A recent theoretical analysis of these studies and related data also implicates Class IV cognitive influences (Zucker 1979). Expectations for future transitions (e.g., toward graduation, adulthood, marriage) are seen as playing a role in the timing of the transition.

Only one study addresses the question of what the major source(s) of contributory influence might be in this process (Britt and Campbell 1977). These data implicate Class IV (intraindividual) and Class I (normative social structural) influences as the primary sources of etiological variance, rather than social environmental (Class III) influences. More research is needed, across a wider variety of populations, situations, and data elements (classes of influence) before these findings can be accepted with assurance.

Finally, insofar as personality and motivational determinants of the process are to a considerable degree shaped by earlier learning and carried via the history of the individual (see figure 2), these data implicitly point to the possible influences of predrinking effects on later drinking stability and change. The Glasgow study (Jahoda and Cramond 1972) is sufficiently provocative to make it essential that these potential precursors be explored, via a longitudinal methodology, in the near future.

A Longitudinal-Developmental Perspective on Alcohol Problems: Research Needs and Research Directions

A developmental view of behaviors, including that related to alcohol use and abuse, in its simplest form implies the ability to link age to drinking phenomena in an orderly way. The complexity of the problem, however, lies in the ability to trace out the vagaries of this process, and to specify the exact pathways and interactions that both anticipate and produce the drinking behavior and problem or nonproblem sequelae. This implies the ability to trace out unfolding and maturational phenomena for the individual, as well as ongoing physiological, psychological, social, and sociocultural events as they affect the unfolding and are in turn affected by it.

So far in this chapter these issues have been dealt with in passing, in the context of existing research and the gaps left unfilled by it. At this point a more systematic examination of developmental issues is in order, as they relate to current etiological research, current models of etiology, and gaps in the conceptual framework that remain to be filled in.

Attention to Physiological and Behavioral Precursors

Perhaps because a longitudinal perspective is more common in the social sciences, virtually all of the extant longitudinal research has focused heavily on sociological and social psychological variables and, to a lesser degree, on aspects of personality as etiological influences. Potential influences that relate more to biology and constitution and to early neurological differences have been virtually neglected despite the scattered but repeated evidence that such factors may be implicated in later abusive drinking problems. Related to this point is the virtual absence of methodologies that study behavioral and personality differences at other than the questionnaire level. This comment applies most strongly to investigations of predrinking and early drinking behavior, but is almost as true in studies of older drinkers, problem drinkers, and alcoholics. There are a few noteworthy exceptions (Kalin et al. 1965; Witkin et al. 1959) but our understanding of these levels of behavioral impact is still very weak.

Issues of Continuity and Discontinuity in Drinking Process

The notion that one developmental conception of drinking, of problem drinking, or of alcoholism should be sufficient is a stumbling block that continues to lead to misunderstanding. The inability to reconcile differences in research findings that are a function of researchers' either looking only for evidence of stability in drinking patterns over time, or looking for evidence of variability-instability, is one such example.

Another related problem is that the developmental sophistication found in other areas of etiological research has been slow to make its impact upon alcohol studies. Developmental models of different pathways of drinking and problem drinking acquisition have emerged that show considerable promise, even though they still encompass a limited range of potential influencing factors (Jessor and Jessor 1977; Kandel 1975; Kandel and Faust 1975). Kandel's model, in particular, constructed primarily to account for multiple drug usage and progression from one substance to another, points up the fact that progression may be halted at any step in the chain as a consequence of stage-specific experiences.

Some researchers consider it premature to apply such developmental sophistication to the arena of alcoholic etiology, given that the unfolding of alcoholic process occurs over considerably longer periods than is true either of drinking onset, or of alcohol abuse. Others have noted that developmental course distinctions, concerning progression of symptoms and differences in etiology, have been made at least since the late 1930s (Jellinek 1960; Knight 1937); these, however, have remained comparatively neglected in attempts at understanding alcoholic development. Given the recent resurgence of interest in onset and course found in current conceptions of psychiatric disability (*DSM III*—American Psychiatric Association 1980), and the renewed attention being paid to the possibility that premorbid, non-symptom-related social competence measures may serve as accurate indicators of vulnerability to or insulation from later disorder (Garmezy 1970, 1981), the time is appropriate to test such developmental conceptions as they might apply to the etiology of alcoholism. Some work has already been done in this area (Levine and Zigler 1973; Rudie and McGaughran 1961; Wagener and Hartsough 1974), but it needs considerable amplification.

Attention to Predispositional Factors in Alcoholism

The necessary emphasis within the last 10 years on the transitory nature of significant numbers of drinking problems has itself tended to focus the search for risk factors on aspects of the environment and on current states of functioning. As a result, despite the evidence which implicates predrinking influences—relating to cognitive activity and parental history—as potential causative factors for alcoholic etiology, these aspects of the process have received virtually no attention. This situation needs to be corrected.

Ongoing Longitudinal/Developmental Studies

Several projects currently in the data collection phases promise to redress some of the issues discussed in earlier parts of this chapter. The research being conducted at the National Center at Rutgers has already been noted in this regard. Another study, being conducted at the National Center at the University of Connecticut Medical Center (Stabenau and Hesselbrock 1978), is utilizing a high-risk cohort sequential design to follow offspring of alcoholic parents from age 16 and thereafter. Retrospective baseline data will offer some information on developmental and academic history, and aspects of social competence as potential insulators to later vulnerability. One of the special features of this study is its thorough evaluation of neuropsychological functioning in the at-risk subjects as compared to controls, and the investigation of family environmental influences.

Another project, being conducted by Robins and Ratcliff out of the Mental Health Clinical Research Center at Washington University, is investigating childhood characteristics and home environment in depressive and substance abusive (alcoholic and other drug) patients (Robins 1977, 1980). Although retrospective and partially methodologically focused in design, the study examines a more complete and systematically derived set of Class I and II influences than has previously been done. These data promise to be an exceptionally fruitful source of hypotheses about predrinking influences that would then need prospective study for confirmation. A related and equally important goal of the project is to identify those environmental influences which are independent of genetic factors.

Work being done out of the University of California, Los Angeles (UCLA) (Coombs 1977), involves a cross-ethnic (Anglo, Chicano) prospective study on younger children (originally ages 9 through 17) who are either users or nonusers of hard liquor or other nonalcoholic drugs. Data collection is focused on extensive measures of family, peer, and school interaction as predictors of continued nonuse or abuse, or the transition from one to the other. In contrast to other studies in this area, the UCLA data will provide unique information at an earlier developmental period than has been done before, within the context of two quite different subcultural settings.

Another project in the early stages of work at Michigan State University also focuses heavily on potential predrinking effects (Noll 1980; Zucker 1980; Zucker and Fitzgerald 1977). Using a statistical high-risk criterion (families with an alcoholic father and at least one male child), the study is examining potential etiological factors in boys and girls ages 2.5 through 5. Factors being examined include temperament, early attachment-separation behavior, mood and activity level, and a number of family interaction and parent variables.

Implications of Developmental and Longitudinal Studies for Prevention of Alcohol Problems

Much of what is currently known about the development of alcohol problems—as well as what future research can tell us—has direct preventive implications. A few of these are briefly considered here.

1. Changes in cognitive capacity directly influence both the types of attitudes youngsters have about alcohol, and their capacity for drawing positive or negative conclusions about drinking from the models they observe. Implications of this have been noted earlier in this report. They strongly suggest that educational input concerned with the modification of drinking attitudes probably should begin earlier, and at the very least should be developmentally tuned to the cognitive processing capacities of the age-relevant target population.
2. Given the importance of transitions from one social role to another (e.g., high school to college or work, the midlife transition, and, possibly, work to retirement), preventive efforts are probably more likely to have impact at these vulnerable times than at indiscriminate applications throughout the life cycle.

Other longitudinal findings suggest that some transition-related shifts in drinking are more controlled by personal changes in role, attitudes, and behavior than legislated by change in external circumstances. Few clues currently exist that would allow prevention workers to anticipate these personal changes easily. To the extent that future longitudinal research is able to pinpoint potential change (possibly via dissatisfaction with current interpersonal relationships, increasing desires for independence, increases in transgressive behavior) before it occurs, this also would suggest a logical point of entry for intervention efforts.

3. Reexamination of figure 1 from the standpoint of prevention suggests that there are potentially four different levels at which intervention activity can take place. To date, the bulk of it has been focused on arenas affecting Class III and Class IV influences (Blane 1976). Potentially, also, Class I influences (Room 1977) and those directly impinging on the family (Class II) are equally viable points of entry. The UCLA study (Coombs 1977) should provide valuable data on this, insofar as an attempt is being made to change family patterns of interaction as the route to altering patterns of substance abuse.
4. Insofar as differences in etiology can be uncovered that reflect different patterns of alcohol abuse, it seems plausible that

children and older persons of different vulnerability would acquire knowledge and attitudes about alcohol at a different developmental pace from their contemporaries, and be susceptible to preventive inputs in a different manner from their contemporaries. Should this be true, intervention strategies should have different goals and potentially greater impact for each population (Deutsch et al. 1978).

5. Ultimately, prospective studies offer the hope that specific "risk" factors can be identified in time to turn the course of the potential disorder away from morbid breakdown. Insofar as continuities over long time spans can be identified for alcoholic etiology, the potential exists for shifting the course of the disorder before it occurs. As one such example, should the existing evidence of greater impulsivity among prealcoholics continue to be substantiated, programs oriented toward modification of this behavior (e.g., Santostefano 1978) would have clear prognostic relevance.

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Chapter 9

Drinking and Personality: Present Knowledge and Future Trends

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Abstract

Traditional ideas about drinking have resulted in personality studies that are primarily actuarial and without theoretical basis. The biomedical model of alcoholism has attempted to explain alcohol use and abuse by classifying alcoholics into types and by isolating an "alcoholic personality." General population studies offer statistical catalogs of a variety of drinking behaviors, but because they lack a dynamic model that relates personality, developmental, environmental, and behavioral variables temporally, these studies are of limited explanatory value. The need for theoretical developments to guide the prediction of drinking is pressing. Because of the predominance of drinking self-reports, an anthropomorphic vantage point in future theoretical developments is recommended. Future models must describe the conditions by which environment and personality together determine behavior, and how these variables are reflected in commonsense notions that affect behavior.

Introduction

Research interest in the causes and developmental precursors of problem drinking and alcoholism has increased in recent years. This research has been guided by the assumption that the treatment and prevention of alcohol abuse requires an understanding of the antecedents as well as the consequences of drinking behaviors. Such antecedents may be found to include a variety of factors: sociocultural and community influences, family and peer influences, and the influences of individual psychology and physiology. Of these factors, psychological influences in general and personality variables in particular have been the least systematically investigated. This paper will examine some of the relationships between drinking and personality, selectively review a variety of research investigations, and propose areas for further study.

The study of personality-drinking relationships begins with the observation that not all people drink, develop drinking-related problems, or have the same prognosis for recovery from drinking problems. Personality is defined by Levy (1970) as those meaningfully patterned behaviors which are internally generated and which are integral parts of a person's identity. These behaviors are, however, described according to a particular observer's mode of perception and manner of organizing his or her own experience. The intent of this research area is to describe relatively stable patterns of individual drinking behavior over time and in varied situations as a function of personality, while acknowledging the roles of biology and of personality-situation interactions.

Three fundamental questions arise in an examination of personality's role in drinking. The first is whether certain personalities are predisposed to certain drinking patterns. If so, forms of drinking that have been conceived as the outcome of different causes may be seen to show developmental continuity. The second question is—whether different drinking patterns are the result of different personality traits—and reflects a consistency discernible at almost any point between personality and drinking-related behavior. The final question raised by personality's role is whether common traits of problem drinkers may be the result and not the cause of their drinking. This possibility assumes the accommodation of personality variables to drinking history. Simultaneous changes in personality and alcohol-related behavior may well be due to social or developmental factors.

These speculations furnish a linear causality model which does not consider simultaneous changes in personality and alcohol-related behavior caused by social and developmental factors. In addition, traditional models fail to consider what may be the crucial variable in any effect of personality on drinking behavior—the drinker's own experience. Next, we consider limitations of this research tradition, recent research using more process-oriented models, and new research developments that support our observations.

Empirical Research

Although knowledge about the antecedents of alcohol use and abuse is likely to require a synthesis of findings from many disciplines, alcohol studies have until now been dominated by a biomedical model. As summarized by Pattison and colleagues (1977), its major tenets include that (1) there is a unitary phenomenon identifiable as alcoholism, (2) alcoholics and prealcoholics differ from nonalcoholics, (3) alcoholics experience physical craving for alcohol and a strong psychological compulsion to drink, (4) alcoholics develop loss of control and inability to stop drinking, (5) alcoholism is a permanent and irreversible condition, and (6) alcoholism is a progressive disease. Its methodological requirements have been to determine characteristics to be measured through criterion analysis and to apply existent measures of personality variables to the prediction of these criteria. Together with three assumptions implicit in the model itself, these techniques have distorted, to a degree, subsequent investigations of personality and drinking.

The first assumption, that alcoholics are fundamentally different from nonalcoholics and that alcoholism is a progressive and irreversible condition, has led to the division of clinical and comparisons groups into mutually exclusive types—alcoholics versus nonalcoholics—based solely on an inclusive and absolute diagnosis of "alcoholism." Such labeling ignores the ingredients and variations that may be truly descriptive of an individual's pattern of alcoholic behavior (Nathan and Lansky 1978). The second assumption follows logically that alcoholics will necessarily show a distinct character type. The third assumption postulates, but does not establish, that drinking criteria will predict each other when in fact they may vary considerably over time and occur together only coincidentally. Genotypic phenomena such as "problem proneness," i.e., beliefs about the instrumentality of alcohol to change the self or aspects of subjective experience in conjunction with believing that others share these beliefs, have been shown in longitudinal studies to be better predictors of continuing drinking problems than intermediate or immediate problem criteria (e.g., Cahalan 1970).

Although the medical model presumes the existence of an alcoholic personality, recent research has established a contradictory heterogeneity among both alcoholic men and alcoholic women. Recent typology studies have shown that no one character type is shared by all alcoholics, but that a number of characteristics are found consistently in alcoholic and prealcoholic groups, i.e., neuroticism and psychopathic deviation (Barnes 1979; Cox 1979; Hoffman 1976; Neuringer and Clopton 1976; Pihl and Spiers 1978). In addition, both male and female alcoholics tend to be more anxious and depressed than normals and other substance abusers. These studies suggest that alcoholism is a symptom of, or a response to, problems in living shared by alcoholics and nonalcoholics alike (Hoffman 1976; Neuringer and Clopton 1976).

This recognition of heterogeneity among alcoholics' behavior and psychological characteristics has been accompanied by a line of nonclinical general population and multivariate studies (e.g., Cahalan et al. 1969). Disavowing the biomedical schema of alcoholism as a discrete entity, these studies investigate the forms and prevalence of drinking in three phases: (1) through describing drinking practices and attitudes in the general population, (2) through describing specific problems related to drinking, and (3) through analyzing longitudinal data on the drinking behavior, attitudes, and problems of several individuals. Some problems surveyed by this research include belligerence associated with drinking, psychological dependence, problems with friends or neighbors, frequent intoxication, binge drinking, symptomatic drinking, and problems with spouse, relatives, or police.

An important finding of these studies is that problem drinking is more prevalent among men under 25 and that extensive changes may occur in problem drinking over time (Clark and Cahalan 1976). In addition, surveys indicate that environmental and attitudinal influences contribute more than personality variables to later problem drinking (Cahalan and Cisin 1976). Such conclusions cast doubt on the biomedical model of alcoholism as irreversible progressive deterioration, since drinking problems may later show remission and be influenced by various external conditions.

In summary, the biomedical model of alcoholism has attempted to explain alcohol use and abuse by classifying alcoholics into types and by isolating an "alcoholic personality." General population studies offer statistical catalogs of a variety of drinking behaviors; but because they lack a dynamic model that relates personality, developmental, environmental, and behavioral variables temporally, these studies are of limited explanatory value. Only multivariate longitudinal research designs with more than two time intervals can permit inferences about changes in explanatory processes over time.

Conceptual and Empirical Concepts

Because the biomedical model has dominated alcohol studies, most personality prediction of drinking has been actuarial and without theoretical basis. At present, an anthropomorphic model that defines how psychological, biomedical, and environmental variables interdependently affect drinking behavior is needed. Until future examiners redefine drinking as purposeful human action, however, the dearth of theoretical bases for these investigations will remain.

Fortunately, there is a growing realization that alcohol studies can profit from theoretical approaches. Jessor and Jessor (1977), for example, have demonstrated the feasibility of studying adolescent alcohol use within a framework of individual and situational variables, including personality variables derived from Jessor's theory of deviant behavior. Working from a developmental theory of psychopathology, Sugerman and associates (1965) have shown a correspondence between patterns of alcoholism and psychological development assessed through social competence measures. Theories of drinking can therefore be helpful in delimiting issues and predicting specific outcomes.

Drinking criteria should be selected to reflect practical problems and facilitate prediction of specific phenomena, such as stability in drinking patterns over time or evidence of variability. For example, what should be the criterion of drinking and when should it be applied if socially ideal drinking behavior is self-controlled, situation-specific drinking over the course of a lifetime? Because drinking is an activity integrated both into a situation and into a pattern of behavior, how should we isolate a unit of analysis for criterion measurement? Should there be one criterion or many different ones to measure historically and situationally integrated drinking patterns? One solution might be to classify drinking situations empirically according to their behavioral similarity, yielding units that represent specific drinking x situation interactions. This analysis of "situated" drinking (Orcutt 1975) may serve to delineate drinkers' perception for subsequent use in the prediction process. While thought has been given to these issues (Harford 1978, 1979), it is clear that there are no easy answers.

It is important to distinguish between criterion content and the data collection model. Even though concern for basic instrumentation ensures a degree of reliability in self-report data, the major concern has too often been the technical aspects of data collection rather than the content of the events measured. Because they are reliable and efficient (Sobell and Sobell 1980), the use of self-reports is likely to continue, but it is doubtful to what extent we can justify a methodology that has little conceptual basis. Such conceptual and methodological questions about data collection will require further attention in the future.

Self-report criteria are often construed as objective measures of drinking. Despite commendable efforts to increase their objectivity through multiple data collection methods (Sobell and Sobell 1980), researchers must distinguish between self-reports and the psychological processes which actually underlie different forms of drinking (Stern et al. 1956). Personality measures are presently used to predict standards of performance retroactively, not to assess the psychological conditions necessary for drinking to occur.

A good starting point, therefore, for future criterion analysis in alcohol studies will be to consider the many and little-understood processes involved in the self-report. Studies have shown that self-reports are affected by the reporting procedure and that knowledge about individual drinking consists of whatever information drinkers choose to provide. In the future, the active role and control of drinkers and abstainers in reporting their own behavior must be more explicitly acknowledged.

Foremost among these hidden self-report dynamics are prior constructs held by both observer and actor. Just as researchers may have preferred ways of thinking and inquiring about drinking, drinkers may use a personal, implicit definition of "drinking" when responding even to behaviorally oriented questionnaires, for behaviors also are ordered selectively in terms of constructs held by actor and observer. Not perceived directly by either, they are no less subject to interpretation than cognitions. Mehrabian (1968) contends that the interpretation an observer places on events is influenced by an implicit metaphor or analogy thought to be applicable to the events observed. Criterion analyses must recognize the importance of these existing meanings and interpretations for the further use of self-report methodology.

Units of analysis might be developed by attending to drinkers' experience of quantifiable behavioral phenomena, together with the purpose and consequences of those specific actions. For example, these units might include behavioral and experiential changes related to the initiation of drinking. These changes, in turn, may serve as feedback to maintain or terminate activity stimulated by situational information. Identifying situation-specific behaviors and perceptions of feedback may therefore be a noteworthy task of future criterion measurement. This increased attention to the stimulus value of drinking criteria will increase the reliability and utility of a respondent's reaction to them in self-reports.

As well as being instrumental to criterion analysis, a theoretical foundation must govern the selection of predictor variables. Criterion analyses of drinking patterns should provide hypotheses about the affective, cognitive, behavioral, psychophysiological, and interpersonal features of different drinking patterns. Measures and experimental tests of those processes can then be assembled, and predictors arranged in accordance with the hypothesized model and its paths of influence. Because prediction involves the choice of measuring instruments postulated to share features with the psychological and drinking criteria, careful selection of those predictors is essential.

A theoretical perspective can also determine when and in whom to sample predictor and criterion measures. Jessor and Jessor (1977) have shown that "transition proneness," behavior uncharacteristic of chronological norms, is a strong predictor of adolescent drinking. The individual requirements of a model can also isolate relevant or high-risk subgroups from the general population for whom prediction of infrequent drinking is impractical.

These are a few examples of the need for, and predictive value of, analyzing process requirements of different forms of drinking and developing a model to conceptualize their generative processes. However, the construction of such a model will require attention to several issues. First, although theories of drinking that include personality variables among their causal factors can be used to predict drinking patterns, changing external factors may also affect these patterns in ways as yet unknown. Drinking patterns may be significantly altered chronologically by development and historical conditions. Specific external influences could include situations and environmental histories as well as drinkers' biological and psychological traits, self-perception, and personal anticipation of these influences. Such personal and environmental variables are likely to be reflexive and recurrent, but little data exist to describe their patterns or development (Zucker 1979). Equally important and equally lacking is an understanding of their interaction.

While multivariate, interactional drinking models already exist (Jessor and Jessor 1977; Zucker 1979), future models must indicate functions by which the environment and the person interact. Braucht (1980) has also noted this requirement. More detailed knowledge about feedback and interpretive processes will be needed in order to describe theoretically the causal mechanisms of interaction. Also needed will be further investigation of contextual meanings in a drinker's perception of his or her environment. Ethnographic research indicating the rule-governed nature of drinking (MacAndrew and Edgerton 1969; Weibel 1979) demands greater attention to specifying the actions appropriate to various situations as socially distinct. Future theoretical developments must specify the medium of interactions as well as delineate stability and change in interaction events.

Perhaps the least seriously considered influences on drinking behavior are the drinker's own intuitions and commonsense explanations of his or her experience. Future theories of drinking will need to examine more closely, for example, the phenomenon alcoholics themselves often dub "loss-of-control" drinking. Persons with alcohol problems of varying severity do not experience physical dependence merely from consuming small amounts of alcohol, but will nevertheless perceive themselves dependent in particular situations. Recent research has demonstrated that meanings are involved in drinking (Gaines and Zucker in press; Marlatt and Rohsenow 1980; Sobell and Sobell 1978), but more work is needed to establish how these meanings develop to influence behavior, as in the loss-of-control phenomenon, and are in turn influenced by drinking settings.

In summary, the need for theoretical developments to guide the prediction of drinking is pressing. Because of the predominance of drinking self-reports, we favor an anthropomorphic vantage point in future theoretical developments. Future models must describe the causal functions by which environment and personality together determine behavior, and how these functions are assumed to be reflected in commonsense notions that ultimately affect behavior.

Recent Empirical and Theoretical Developments

Drinking models that are linked to drinkers' experience are needed to bring future theoretical developments into consonance with current observation methods. Sensitivity to these experiential determinants of drinking requires a study of their meanings and of beliefs about drinking functions and effects. These beliefs about drinking, as about all phenomena, serve to integrate experience, bringing to human action a long-term continuity implied by the study of personality.

This discussion will briefly describe research and theoretical developments investigating phenomenological aspects of drinking beliefs, and drinkers' perceptions of control, responsibility, and causality in their behavior. Since drinkers have differing degrees of free choice over their drinking-related actions and differing abilities to articulate their experiences perceptually, we will also describe research on drinkers' psychological differentiation. Our interest in drinking beliefs, effects, self-control, and differentiation is not intended to suggest, however, that alcohol dependence is the direct result of conscious purpose or even of the absence of volition. While normal drinkers and alcohol-dependent people often make commonsense observations and form quasi-empirical theories about their drinking, other dynamics are undoubtedly present in their behavior. Questions about rules that govern drinking, strategies that facilitate "going on the wagon," and the cognitive restructuring that enables some alcoholics to break destructive patterns and return to nonproblematic drinking (Sobell and Sobell 1978) are extremely important.

Recent ethnographic and laboratory studies emphasizing the role of cognition indicate that drinking patterns are meaning- and situation-specific. Weibel (1979) reports that urban American Indians voluntarily monitor situational feedback in accordance with tribal drinking rules. Also, young social and heavy drinking males will consume more in the presence of a heavy drinking model or when anticipating evaluation by others (Hendricks et al. 1978; Higgins and Marlatt 1975). Laboratory studies with alcoholics and social drinkers indicate that expectancy effects often predominate over pharmacological ones when drinking occurs (Marlatt and Rohsenow 1980). Finally, longitudinal and cross-sectional research indicates that drinking attitudes and beliefs are important predictors of problem drinking (Cahalan 1970; Cahalan and Room 1974).

Drinking Beliefs and Perceived Effects

Two assumptions have recently been identified and related to phenomenological aspects of drinkers' beliefs. First, in the tradition of information processing and computer programing, drinking beliefs are assumed to be causal antecedents of behavior. Individual differences in drinking beliefs and expectations are seen to guide the drinkers' activity and experience, but the processes by which these structures operate are not specified. Most research on these beliefs, moreover, has been limited to a tabulation of alcohol-specific cognitions.

Second, a more dynamic model of drinking beliefs assumes that self-reports about drinking represent efforts to render previous drinking experiences intelligible. This view is influenced by the sociological theory of accounts and the social psychological theory of self-perception. The former analyzes the role of beliefs in processes by which individuals present their lives to themselves. The latter assumes that individuals come to know their internal states, such as beliefs and feelings, by inferring them from observations of their own behavior and the circumstances in which the behavior occurs.

Individual differences in drinking beliefs and perceived consequences are now being systematically studied and related to drinking patterns, alcoholism, demographics, and various other outcomes. While general and personal beliefs about drinking are similar in normal and alcohol-dependent individuals (Beckman 1980), patterns of motivation, consumption, and perceived effects are varied and appear related to involvement and drinking patterns. For example, Beckman (1980) reported that particular drinking motives characterize both male and female alcoholics. Further, women alcoholics appear more likely than female nonproblem drinkers to desire alcohol when they perceive themselves as powerless and lacking in control. Nonalcoholic women, on the other hand, more frequently use alcohol to be more sociable. These data suggest that beliefs about alcohol's utility can influence the nature of its use.

Other studies of alcoholics, psychiatric patients, and normal drinkers also have examined drinking beliefs and perceived drinking consequences. MacAndrew and Garfinkel (1962), for example, found the "sober" and "drunk" self-portrayals of male alcoholics markedly dissimilar. Further, sober alcoholics reported alcohol as useful in increasing assertiveness. In another study, Tamerin and colleagues (1975) reported that upper middle class male and female alcoholics perceived (a) positive psychological benefits from drinking and (b) feelings of inadequacy over stopping, while acknowledging, it should be noted, a range of negative drinking consequences. Gunn (1973) found that male psychiatric patients with negative attitudes toward drinking reported more frequent hangovers after drinking than those without such negative views. Further, patients who thought their behavior changed noticeably while drinking reported more hangover symptoms the next day, particularly those respondents with negative drinking attitudes.

Finally, Brown and associates (1980) developed a questionnaire of alcohol reinforcement expectancies with normal subjects. Six independent sets of expectancies regarding alcohol were found: (1) alcohol transforms experiences in a positive way, (2) it enhances social and physical pleasure, (3) it enhances sexual performance and experience, (4) it increases power and aggression, (5) it increases social assertiveness, and (6) it reduces tension. Particular expectancies were associated with differences in drinking patterns. Specifically, less exposure to alcohol and limited consumption were associated with more general positive expectancies.

Thus, these recent investigations, taken together, suggest that drinking motives may be an influence on drinking patterns and alcohol-related problems. In turn, it appears that drinking patterns and problem level may influence the perception of drinking effects.

Self-Perception of Control

Loss of control over drinking, a defining characteristic of alcoholism (Jellinek 1960), has recently come under conceptual and empirical investigation (Edwards 1974; Marlatt et al. 1973). Phenomenological characteristics now being studied in this regard include the drinker's perception of his or her effectiveness in regulating his or her life. Beliefs concerning generalized expectancies of control of reinforcement are being studied in order to understand perceptions of personal power or inadequacy. According to Rohsenow and O'Leary (1978), much recent work in this area has been stimulated by the hypothesis that alcoholics would have a more external locus of control. This speculation followed observations that alcoholics seem unable to control their drinking behavior, to cope effectively, and to accept responsibility for their behavior. Investigations were also generated by the observation that alcoholics report the ability to control and change their drinking in spite of past experience. In summarizing research in this area, Hinrichsen (1976) and Rohsenow and O'Leary (1978) conclude that no clear trends emerge in the data. Unfortunately, most of this research was found to be methodologically unsound.

More recently, a study by de Blij and Hinrichsen (1980) has raised questions about what the Rotter (1966) internal-external locus of control scales measure in alcoholics. De Blij and Hinrichsen examined whether differences in the behavior of internally and externally oriented alcoholics are theoretically consistent with the primary measurement instrument for this research area (i.e., Rotter's 29-item forced choice scale of generalized expectancies for internal versus external control of reinforcement). Three questions suggested by the theory underlying the internal-external scale were posed: (1) Are internally oriented alcoholics more resistant to manipulation by subtle interpersonal influences than externally oriented alcoholics? (2) Are externally oriented alcoholics more likely to prefer tasks containing built-in rationalizations for failure than internally oriented subjects? and (3) Are externally oriented alcoholics more likely to attribute the outcome of problem-solving tasks to luck than internally oriented subjects? Their data provided negative answers to these questions.

Recently, studies of self-perception of control have begun to examine alcoholics' experience of control specifically over drinking. Donovan and O'Leary (1978) found that alcoholics had a greater external locus of control over drinking than nonalcoholics. Stafford (1980) has recently extended this line of research to examine perceptions of responsibility, control, blame, choice, and causality. He hypothesized that (1) alcoholics who subscribe to the disease model of alcoholism are more likely to view the locus of their drinking problem as external, and (2) alcoholics whose perceived locus of drinking problem is external would be more likely than internal alcoholics to solicit outside help. The results supported both predictions. These two studies suggest the need for further attention to the cognitive factors, and their behavioral correlates, that contribute to the attribution of responsibility for drinking problems. Thus far, correlates of these beliefs have held important practical implications. For example, alcoholics with different perceptions of their drinking problem's locus might show different responses to treatments perceived as coming from either internal or external sources (Stafford 1980).

Psychological Differentiation

The third major development in the study of drinkers' phenomenology concerns the cognitive control of field articulation. Cognitive controls regulate and manage subjective experiences by governing and controlling the amount and organization of available information (Bieri 1971). Field articulation, or psychological differentiation, is an ability or inability to articulate various aspects of experience perceptually. Such behavior represents a perceptual and cognitive style. The process of differentiation is assumed to proceed from a fundamental discrimination between self and environment; it includes the progressive articulation of body image as well as more refined differentiation of the environment. Procedures requiring a discrimination between figure and ground, reflecting a global-analytic perception dimension, are often used to measure this cognitive control. A person who is unable to articulate, or discriminate, the elements of his or her experience tends to perceive in a field-dependent, relatively global fashion. Such subjects conform passively to the prevailing field or context and fail to show a well-defined sense of separate identity.

The more numerous the means of representing experience in a given situation, the greater the selectivity which must be exercised to cognitively manage that experience, and the less can either objects or events be considered responsible for it. This cognitive management amounts to perceptual freedom of choice. Investigators have found that alcoholics tend to perceive the world in a way that is strongly dominated by the prevailing field (Goldstein 1976; Sugerman and Schneider 1976) and show an inability to articulate perceptually the various aspects of their experience.

Two hypotheses have been advanced to explain the relationship between psychological differentiation and alcoholism. They are, first, that a field-dependent style of perceiving is predispositional to alcoholism (Witkin et al. 1959), and second, that alcoholic drinking contributes to field dependence (Goldstein and Chotlos 1966). Summaries of the research generated by these hypotheses have recently been published (Goldstein 1976; Sugerman and Schneider 1976). Although great diversity of methodology and types of subjects exists, field dependence seems to be a characteristic of alcohol-dependent people, yet there is little theoretical understanding of field dependence itself. While some investigators believe it reflects the generally immature and dependent nature of alcoholics, field dependence does not always correlate with behavioral measures of dependency. Recently, Jacobson (1971) hypothesized that drinking suppresses body-generated internal stimuli that conflict with environmentally produced stimuli, reinforcing field-dependent behavior.

Summary

Investigations of drinking beliefs, effects, and personal control have studied verbal representations of action and action-outcomes. Yet linguistic expressions of action may merely furnish the bases for subsequent cognitive representations and may not be by themselves definitive. These verbal self-reports are consequences of the way the drinker, the setting, and action are organized. Unfortunately, studies have not yet been performed to investigate how these representations are involved in the elaborate choice and decisionmaking processes that precede drinking. We know, however, that alcoholics can control their drinking in extensively monitored settings (Mello 1972) where rules of behavior and accessibility to alcohol are not ambiguous. Unfortunately, virtually no research has been done on the way alcoholics distinguish environmental settings, or on the ways the self is experienced as disjointed from the environment. This distinction between settings and the experience of self as a discrete entity is crucial to feedback processes and successful interchange between the drinker and his or her environment.

Other Developments and Future Needs

In future theoretical developments, the fundamental question will be how a drinker's own conceptualization and organization of his or her experience are related to the processes that generate drinking. We see this problem most clearly in experimental studies of drinking expectations (Marlatt and Rohsenow 1980). The results of these studies suggest that the fulfillment of deliberately activated expectations in some cases is due more to cognitive than to pharmacological processes. It must be added that these drinking outcomes were presumed to be the result of the drinker's beliefs, which were inferred and not directly assessed. These results do suggest, however, a disinclination to view alcohol dependence as an involuntary reaction to pathological conditions. It would appear plausible to assume an interaction between the psychological variables which generate an activity and which reflect the experience of the activity, whether it be self-initiated or self-regulated. In this section, some recent theoretical statements reflecting an interactional model of drinking are briefly presented.

In a recent model by Gaines (1979), drinking is depicted as an activity which is not programed and which is performed for reasons which are meaningful to the drinker. It represents an active transaction between the person and his environment, and is a means of organizing the relations experienced between the self and the environment such that the act of drinking itself can give the situation a meaning or significance.

In this model, changes in alcohol-related transactions between person and environment are both reflected in and caused by changes in subjective states. Mello (1978) also has recently observed that people seem to drink and use other drugs to alter stimulation, even if it involves experiencing aversive states. We can infer that people drink in order to alter their awareness and perceptions of self and situation as well.

These changes in subjective experience are the product of not merely environmental factors upon perception, but of an interchange between the two.

Some requirements for future theoretical developments are discussed in Maisto and colleagues' (1981) model of alcohol intoxication, which utilizes a reference-level approach and a specific focus on expectancies regarding alcohol effects in accounting for an individual's drinking behavior and for the response to alcohol. These authors view tolerance as an explicit influence on the feedback processes that operate during drinking. Degrees of acquired tolerance are a critical component of an individual's perception of the link between expectations of alcohol's effects and the actual consequences of drinking. Lemmert (1979) also has proposed that changes in drinking are a result of the interplay of human action and expectations.

The Gaines (1979), Lemert (1979), and Maisto et al. (1981) efforts are suggesting in part a redirection of research on the relationship between personality and drinking. To date, research in this area has been conducted with insufficient attention to the critical conceptual and empirical issues outlined earlier in this paper. It may be that development, stability, and change in alcohol-specific psychological variables, such as action-generating cognitions, will become the focus of a new paradigm for alcohol studies in this area.

Summary

In this paper we have addressed two broad topics. The first of these is the tradition and status of research designed to investigate the relationship between personality and drinking, especially alcoholism. This research has not revealed a clearly delineated constellation of personality attributes which can be used to identify those individuals predisposed to alcohol abuse. The second broad topic dealt with directions for future research in this area, using as a springboard a discussion of several important conceptual and empirical issues that will require further attention.

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